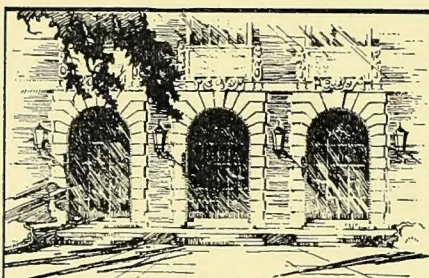


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Vigors, N.A.

Observations on the natural affinities that
connect the orders and families of birds.

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XXII. *Observations on the Natural Affinities that connect the Orders and Families of Birds.* By Nicholas Aylward Vigors, Esq. M.A. F.L.S. Communicated by the Zoological Club of the Linnean Society.

Read December 3, 1823.

ON looking back to the progress of zoology since it first began to be cultivated, it may be observed, that the steps by which it has advanced to its present comparative state of excellence have been more rapid within the last few years than during the entire period of its antecedent existence as a science. The vast accessions which have been made to our knowledge of animal life within the present century by the zeal and industry of scientific travellers; the copious fields of investigation which have been opened to the naturalist by the extended relations of European commerce and colonization; the assistance which has been afforded by the sister science of geology, in adding the remains of a former world to enrich the stores and supply the deficiencies of the present, have increased the materials of zoology to an extent which the most sanguine views of its earlier cultivators could scarcely have anticipated. But it is not so much in the additional dignity which has been conferred on the science by this copious accumulation of facts and materials, that its improvement consists, as in the mode of investigation to which it gave rise, and the comprehensive views which it necessarily imparted. In the infancy of the science, the knowledge of individual species,

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cies, while they remained comparatively few in number, was easily acquired and retained. And the naturalist, in devoting his attention to them, seemed to have had no other object in view but to study them in detached and isolated groups, un-compared and unconnected with each other. Nay, after the gradual increase of the materials of zoology had rendered systematic arrangement necessary for their illustration and comprehension, the various systems proposed by scientific writers were confessedly artificial, and instituted alone for the avowed purpose of forming an easy reference, by which the names and qualities of individuals might be discovered. Classification thus held out but a mere index to the volume of Nature ; a catalogue which the naturalist might consult to determine a name or identify a species. But new subjects arrived to perplex by their multitude, and new forms to confound by their variety, the limited views of the systematist. The natural growth of his subject, as it expanded beneath his hands, was sufficient of itself to break through the artificial fetters with which he would have circumscribed it. Forced to abandon the narrow paths of his predecessors in a pursuit which seemed calculated, by the inexhaustible profusion it exhibited, to baffle all research, the true naturalist sought in Nature herself for the means of unravelling her apparent perplexities. He studied the affinities of her various groups ; he investigated the mutual relations by which they seemed to approach each other ; he applied to comparative anatomy as a guide to their analogous conformation ; and he traced out their geographical distribution as some clue through the "mighty maze" that lay before him. His mind expanded as the materials of his research became multiplied. He learned to generalize his observations. He looked upon the creation with a more enlarged and philosophic eye—he applied a grander scale to its dimensions—and he ceased to dwell merely on the wonders of the indi-

individual, as he caught a glimpse of the newer and more specious wonders displayed in the extensive affinities and combinations of the whole.

It is to our continental neighbours that we are chiefly indebted for these valuable improvements in zoology. The zeal and ability with which they applied themselves to the study of comparative anatomy in its various branches, have laid the justest foundation for all zoological investigation. It reflects some reproach upon this country that little aid was given to such labours by the industry of her naturalists. I know not the cause why among the different branches of natural history, comparative anatomy alone has hitherto experienced so much neglect: but it is a fact often and deeply lamented, that, with the exception of one or two splendid names which have appeared among the writers on the *Annulosa*, the general poverty of our reputation in zoology forms a striking contrast to the never-dying fame which has been earned by some of our naturalists in the vegetable and mineral kingdoms. Great Britain, however, has made ample amends for her tardy adoption of the more philosophical views of the science, in the masterly use to which she applied them when once adopted, and the rapid strides by which at once, as it were, she outstripped all previous research. It has been reserved for one of her sons to throw a new light upon the sphere of animated Nature, and to bring to view a principle that pervades her works, as beautiful as it is comprehensive. In the year 1819, the enlightened author of *Horæ Entomologicæ* first called the attention of the lovers of science to a principle which he discovered in a minute group of insects; and which, with a comprehensiveness of mind, and an accuracy of execution, seldom united in an individual, he subsequently followed up through the whole range of animal life. It would be superfluous for me to enter into a detail of the important theory so

successfully developed by the distinguished individual to whom I allude, before a Society which is familiarized with the principles in question. It is sufficient in these few preliminary observations to refer to the great revolution which the publication of these principles has effected in zoology. It has raised the science to that elevated rank among the subjects of human research, to which, whatever might have been its intrinsic claims, it was seldom, from the alleged minuteness of its views, allowed to assert its pretensions. The investigation of Nature has ceased to be a mere work of observation : the mind becomes as much employed as the eye ; and the intellectual character of the science as undeniably unfolds itself, as its general usefulness, or its acknowledged powers of affording delight. It is no longer devoted merely to minute and limited details, but to grand and sublime combinations ; no longer to the investigation of the properties of the individual, but to that of the place which this fills and the part it sustains in the great system of Nature. The diffusion of these principles wrought the same change as may be supposed to have affected the views of the early astronomer, when his attention was withdrawn from the mere observation of the splendid orbs of the firmament, from conjecturing their apparent stations, and summing up their various names, to the more sublime contemplation of the harmonious system in which they revolve through infinite space. But the developement of this theory went still further. To those persons who were induced to seek a more intimate acquaintance with the works of Nature by the noblest, and indeed only legitimate end of all such research—the desire of studying “the wisdom of God in the creation,”—a new source of delight was thrown open, a new region of wonder revealed ; as they were now enabled to trace that wisdom not merely in the detail,—not merely in the beautifully combined mechanism of an isolated object,—but in the comprehensive system

system by which all are united, and the harmony that prevails throughout.

The system which has been traced out with so much success by the author of *Horæ Entomologicæ* in various groups of the animal kingdom, prevails in none more conspicuously than in those of ornithology. Having lately devoted considerable attention to that captivating branch of science, I discovered as I advanced, that the larger or primary groups into which it arranged itself were connected together by an uninterrupted chain of affinities; that this series or chain returned into itself; and that the groups of which it was composed preserved in their regular succession an analogy to the corresponding groups or orders of the contiguous classes of zoology. I equally detected the existence of the same principle in most of the subordinate subdivisions, even down to the minutest, to a degree at least sufficiently extensive to afford grounds for asserting its general prevalence. With the permission of this Society, I shall lay before them, as their leisure will permit, some of the results of these inquiries: and, in the present paper, shall trace out the outline of that general arrangement which appears to me to prevail throughout the feathered tribes. In this attempt, however, I must premise, that I aim at no innovations in science, no opposition to the views of those distinguished naturalists who have preceded me on this subject. I wish to found my deductions alone on the facts which they have brought together, and the principles which they have established; making those more particularly my guides, who have paid the closest attention to the natural affinities of the objects they have classed. The materials upon which I work are selected from the labours of those who are most competent to decide on the subject. All that is new is the mode in which these materials are combined.

I must equally premise, what indeed it is almost superfluous
to

to observe, that any attempt to exhibit the natural distribution of the groups of ornithology must necessarily, in the present state of our knowledge, be in a great degree defective. Extensive as have been our acquisitions of late years, our knowledge of this department of animal life may still be said to be in its infancy. Were I to assert that we have now attained a satisfactory view of Nature, so far as to enable us to pourtray a complete and finished arrangement of her works, the new forms that are every day pouring in upon us, the very exhibition* at the last meeting of the Society, collected in a hitherto unexplored region by the zeal of one of its most valued members, and placed at its disposal by his liberality, would sufficiently prove me in error. But it is not alone in the knowledge of forms that we are deficient, but in that of the habits, economy, and internal anatomy of many species, nay, entire families, with whose forms we are already conversant. Collectors of natural history are not always men of science; nor have scientific men, even when they become collectors, at all times the leisure or the opportunity of making those minute observations that may determine the natural affinities of the objects that come in their way. This is a deficiency that most frequently baffles the systematic ornithologist, who for the most part has but the external covering of a bird to assist him in ascertaining its place in nature. The bill and legs may indeed decide the more extensive subdivision or order under which it arranges itself; but its affinity to any of the subordinate groups can be pronounced with no certainty, until its internal structure and general economy be ascertained. Hence it arises that some chasms will occasionally occur in the following attempt at a natural arrangement; and many minute

* The exhibition alluded to is the very valuable collection of birds formed by General Hardwicke in Nepaul, and most liberally presented by him to the Linnean Society.

groups will appear, of whose place in nature I must speak with hesitation. But while it must be acknowledged, that some deficiencies will intervene in the chain of evidence by which I would endeavour to establish the existence of a uniform succession of affinities in the feathered creation, it must be equally observed, that there is no contradiction to it. The chasms that occasionally present themselves are such as may be supposed to originate in our limited knowledge of the subject. Time may supply the absent links of our chain, as it has already supplied, and still continues to supply many: and, judging from the past, we need not despair of finding every deficiency filled up from the daily discovered relics of a former world, or the exhaustless recesses of the present.

It has been observed* that, if the natural groups into which the animal kingdom is divided bear a uniform analogy to each other,—a principle which is among the most important of those involved in the system which I wish to illustrate,—it is a necessary consequence that their number should be definite. The primary groups of those departments of the animal kingdom which have hitherto been investigated, have been ascertained to be limited to five; and the first great divisions of birds will be found to branch out into a similar number. The characters of the types of these leading groups are so strongly and distinctively marked, that they could not escape the comprehensive eye of Linnæus, whose tact in seizing upon the grander affinities of natural objects, and bringing them together in their greater groups, has left him without a rival among naturalists. Four of his orders, which possess such distinctive characters as will not admit of their being confounded together, may be at once adopted with some slight modification. The powerful and strongly-hooked

* See “Remarks on the Identity of certain general Laws,” &c. &c. by W. S. MacLeay, Esq. in the present volume of the *Transactions*, p. 55.

beaks and talons ; the retractile nails, analogous to those of the typical *Carnivorous Mammalia* ; the muscular bodies, the rapacious habits, and animal food of the BIRDS OF PREY (*Accipitres*, Linn., *Raptatores*, Ill.), at once distinguish them from all others. The strong and ambulatorial feet of the GALLINACEOUS BIRDS (*Gallinæ*, Linn., *Rasores*, Ill.), adapted to the region where they chiefly resort for their food and the purposes of incubation ; their toes and nails peculiarly formed for scratching up the grains and seeds which constitute the main part of their subsistence ; their short wings, and the weakness of their pectoral muscles, which cause the heaviness of their flight,—a deficiency which is counterbalanced by the strength of those muscles of the thighs and legs that contribute to their powers of running ; their gregarious, and, generally speaking, polygamous habits ; the ease with which they are domesticated ; their wholesome flesh, together with many striking peculiarities in their anatomy, serve equally to distinguish them. The WEB-FOOTED BIRDS (*Anseres*, Linn., *Natatores*, Ill.) are no less set apart from the remainder of the feathered tribes by the existence of the membrane connecting the toes, which assists them in swimming, and gives them the command over that element whence they derive their food. Their downy bodies serving alike to defend them from the effect of the waters and to buoy them up in their natural element, and the shortness and backward position of their legs, which contribute to their powers in swimming and diving, but incapacitate them from walking on land,—are equally characteristic of their peculiar economy and station in nature. The WADING BIRDS (*Grallæ*, Linn., *Grallatores*, Ill.) living on the land, but deriving their support from the water,—are no less strongly pointed out by the form of their legs and bills, which are exclusively adapted to their amphibious nature. Their long legs naked above the knee, by which they are enabled to enter

enter the water to a considerable depth in search of their food, —their lengthened toes, stretching out in some instances to an apparently disproportionate extent, by means of which, in addition to the lightness of their bodies, they find a firm footing among the aquatic plants and unstable marshes, where birds of a more contracted foot and a heavier form would necessarily sink, —the length also of their neck and bill, by which they seize upon their food, or draw it out by suction from the above-mentioned situations,—all these characters present incontestible indications of the part they maintain in Nature, and prevent their being confounded with any other of her groups. The two remaining orders of Linnæus, his *Picæ* and *Passeres*, although kept apart by that great master, appear to me to range themselves decidedly into only one group of that degree. In this opinion I am borne out by the assertion of M. Cuvier*, that he can discover no line of demarcation by which they can be separated as distinct orders. There is in fact no character assigned to either of these pretended orders, which may not be equally applied to some groups in the other: while, on the other hand, there are groups in both so nearly allied in affinity, that they cannot be kept far asunder, much less be asserted to possess such distinctive characters as to belong to different orders. The genera *Oriolus* and *Turdus*, Linn., may be cited as examples of this imperfection of the Linnean system; where the true *Oriole* of the former genus is removed from its close affinity to *Turdus*, and placed in a totally remote situation. *Lanius* and *Muscicapa* may be equally adduced as

* “Malgré tous mes efforts, il m’a été impossible de trouver, ni à l’extérieur, ni à l’intérieur, aucun caractère propre à séparer des passereaux ceux des genres compris parmi les *Picæ* de Linnæus qui ne sont pas grimpeurs.”—Cuvier, *Regne Anim.* tom. i. p. 335. (note).—M. Vieillot is of the same opinion: “J’ai — supprimé son ordre *Picæ*, et je l’ai fondu avec ses *Passeres*, vu que les uns et les autres ont une parfaite analogie dans les attributs que m’a fournis le pied, la seule partie que j’aie consultée pour caractériser mes ordres.”—*Analyse d’une Nouv. Ornithologie Elementaire.* p. 1.

examples of conterminous families being disjointed from each other by Linnæus, and grouped in separate orders. This is so much the case, that some of the strict adherents to the Linnean classification have actually placed the same bird in different orders at different times, according as they have fancied it to agree with the different characters of these two conterminous genera. For these reasons, and others on which I shall dwell more fully hereafter, I feel no hesitation in deciding with M. Cuvier, that these two Linnean orders may be united into one. The birds that thus compose it may on a first view be considered to be held together, as that distinguished naturalist has also observed, rather by a negative than a positive quality ; rather by not belonging to any of the other orders, than by any immediately striking character of their own. But further observations, as we enter more deeply into their details, will evince that they do in reality possess characters sufficient to separate them from their conterminous orders, and to connect them by a continuous series of affinities among themselves. Among these birds will be found the most perfect type of this class of the animal kingdom. The volume of brain is greater among them than in any other order, and their intelligence is proportionally stronger. Many of them are omnivorous : some are endowed with the most powerful vocal organs, and, of all the inferior animals, imitate the human voice with the greatest exactness. In this order also may be observed the birds which apply their feet to the greatest variety of purposes ; occasionally using them in climbing, and in taking their food. The foot here, as it were, becomes a hand. It is difficult to give this order a name sufficiently indicative of its character. Neither of the Linnean terms are applicable. We cannot assign the name of *Picæ* to a group which, among other birds equally disagreeing with the title, includes the small and delicately-formed *Warblers* : nor can we, on the other hand, confer the denomination of *Passeres* on a tribe

tribe which contains the *Raven* and the *Hornbill*. I should wish in general to adopt those names which M. Illiger has assigned* to his orders, as most expressive of the typical character of each ; but in the present instance, his term of *Ambulatores* is not suitable. In addition to its excluding the tribe of scansorial birds whose feet are not formed for walking, it offers no distinguishing character sufficient to separate the group from the families of the *Gallinaceous* and *Wading* orders, all of which may be said to be walkers, and walkers *per excellentiam*. As the distinctive characters in the other orders are taken from the peculiarities of the feet, and their names consequently derived from that part of their structure, I wish, for the sake of uniformity, to follow the same plan in the present case, and to designate this order by the title of INSESSORES, or PERCHING BIRDS. Some of the extreme genera in the conterminous orders, it must be admitted, approach this character of perching. But this very character by which such genera deviate from the type of their own order, (more particularly in the *Gallinaceous* groups, as will be observed more fully hereafter,) is that which indicates the affinity that unites them with the true *Perchers*. It may also be objected to the above title, that it is not applicable to certain genera in the order, which, strictly speaking, do not perch :—part of the Linnean genus *Alauda*, for instance, the true *Motacilla*, and perhaps the *Pezophorus* of Illiger. But it must be observed that there are no groups, particularly of the more extensive kind, where some of the extreme branches do not depart more or less from the typical character ; preserving at the same time some rudiments of it, as is the case in the exceptions just brought forward. Though their habits are not those of the more perfect *Perchers*, their feet are not incapacitated from perching, as we may observe to be the case in the

* The term *Raptatores* of that naturalist I have ventured to alter to that of *Raptores*, which appears to me more classical. The former I believe is not in use.

more distant orders, the *Wading* and the *Webfooted* Birds. On the whole, the term I have chosen appears to me the most comprehensive I could assign, and most expressive of the character which strikes me as prevailing in the type of the order.

There thus appear five great primary divisions or orders of birds, which may be arranged in the following succession :

<i>Pedibus constringentibus</i>	{	RAPTORES, or Birds of Prey.
Birds endowed with feet formed for grasping.		INSESSORES, or Perching Birds.
<i>Pedibus haud constringentibus</i>	{	RASORES, <i>Ill.</i> , or Gallinaceous Birds.
Birds endowed with feet incapable of grasping.		GRALLATORES, <i>Ill.</i> , or Wading Birds.
		NATATORES, <i>Ill.</i> , or Webfooted Birds.

These divisions deviate in no respect from the long established orders of Linnæus, with the exception of two of his orders having been, as before said, united into one, for which I hope sufficient reason will hereafter appear. As they succeed each other in the above arrangement, they are in like manner found to coincide with the views of our own distinguished naturalists, Messrs. Ray and Pennant, who have arranged the whole class under the primary divisions of *Land* and *Water Birds*; the three first of the above orders constituting that great group of birds which seek their support on land; the two latter forming those groups which derive their subsistence from the water.

We may now proceed to trace the chain of affinities by which these orders are connected together. On turning our attention in the first instance to the *Birds of Prey*, we may expect to find the nearest approach to the *Perchers* among those extreme groups of the former order, which recede the furthest from its typical character; which possess, in short, to a less degree, the habits of rapine peculiar to the raptorial tribes, and less of that power and robustness of structure which characterize the typical birds of the order. The genus *Strix* of Linnæus immediately presents itself as answering this description, where
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the inferior strength of its organization corresponds with the inferior nature of its prey. When we search, on the other hand, among the *Perchers* for that point where they approximate the *Owls*, we at once light upon a group, the *Caprimulgus* of Linnæus, whose general appearance and habits point out the affinity. The nocturnal and predatory manners* of this genus, the hawking flight, the legs feathered to the talons, the large ears and eyes†, the very disk‡ that surrounds the face, and the pectination of the external quill-feathers, observable in some of the species, the general softness of the plumage, together with its peculiarly striking colour and markings, produce a similarity between it and *Strix* that has attracted the eye of the common observer no less than of the naturalist. The provincial names§ of this genus have generally a reference to this resemblance; while the earlier scientific describers|| of the different species have for the most part ranked them with the *Owls*. I know not whether the singular character observable in some of the species of this family, the serrated nail of the middle toe¶, may not be cited

* “Fures nocturni.” *Plin. Hist. Nat. lib. x. cap. 21.*

† “Ces oiseaux ont de grands yeux et de grandes oreilles; comme les *Chouettes*, ils ont la vue offusquée par la clarté du soleil.” *Temminck, Man. p. 436.*

‡ “The eyes are surrounded with a disk of feathers, not unlike those of *Owls*.” *Latham, Syn. vol. ii. p. 591. Art. Jamaica Goatsucker.*

§ “*Caprimulgus nostras vulgaris et Aldrovandi. Salopiensibus*, the *Fern-owl*; *Eboracensibus*, the *Churn-owl*, a strepitu quem inter volandum edit.” *Raii Syn. Av. p. 26.*

—The following are common provincial names; viz. Night-hawk, Dorr-hawk, Churn-owl, Goat-owl. See *Montague, Ornith. Diction. Art. Goatsucker.*

|| “*Noctua minor ex pallido et fusco varia. Sloane, Voy. of Jam. p. 296. Utula Americana ex pallido et fusco varia. Barr. Ornith. Class iii. Gen. v. Sp. 5. Strix capite levi plumis griseo-albidis labiorum pilosis. Browne, Nat. Hist. of Jam. p. 473. Strix sylvatica, major, pulla. Barr. Hist. Fr. Eq. p. 147.*” These are among the synonyms of the *Caprimulgus Jamaicensis* of Brisson.

¶ The common *Barn Owl*, (*Strix flammea*, Linn.,) possesses the same character of serrated *unguis*; and some other species of the *Strigidae* exhibit somewhat of the rudiments

cited as an additional proof of their approach to the *Birds of Prey*. The strong talons of the latter are lost in *Caprimulgus*: but a construction of similar import (for the serration of the nail appears capable of being applied to the purposes of seizure only) preserves, though faintly, the resemblance. May we not almost venture to affirm, that this apparently trivial appendage is an instance of that beautiful shading by which Nature softens down the extremes of her neighbouring groups—one of those minute and delicate touches by which she marks at once an affinity and a deviation? But while we may discern at a glance the general approximation of these two families, we must at the same time acknowledge that they stand in need of an intermediate link to give them a closer connexion. The weakness of the bill and of the legs and feet of the *Caprimulgus* still keeps it

diments of it; thus establishing still more closely the affinity of the groups under consideration. The conjecture which I have hazarded above, as to the use of the serrated claw,—that is, its being devoted to the purposes of seizure,—receives considerable corroboration from the following observations of an ingenious and diligent inquirer into nature, the late Mr. Gilbert White. “On the 12th of July, I had a fair opportunity of contemplating the motions of the *Caprimulgus*, or Fern-owl, as it was playing round a large oak that swarmed with *Scarabæi solstitiales*, or Fern-chafers. The powers of its wing were wonderful; exceeding, if possible, the various evolutions and quick turns of the Swallow genus. But the circumstance that pleased me most was, that I saw it distinctly, more than once, put out its short leg while on the wing, and, by a bend of the head, deliver somewhat into its mouth. If it takes any part of its prey with its foot, as I have now the greatest reason to suppose it does these chafers, I no longer wonder at the use of its middle toe, which is curiously furnished with a serrated claw.” *Nat. Hist. of Selborne*, Letter 37. p. 94.

Mr. Wilson, another accurate observer of Nature, assigns a different use to this serrated claw. When speaking, in his “*American Ornithology*,” of the *Caprimulgus Carolinensis*, he tells us that the birds of that species, “reposing so much during the heats of day, are much infested with vermin, particularly about the head, and are provided with a comb on the inner edge of the middle claw, with which they are often employed in ridding themselves of these pests, at least when in a state of captivity.” Vol. vi. p. 97. See also vol. v. p. 77. This can be at best but an accidental use to which

it at some distance from the *Owls*, in which the same members are comparatively strong; while the wide gape of its mouth serves to divide the families still further*. A connecting link has been however supplied by an Australasian group, the *Podargus* of M. Cuvier, which harmonizes these discrepant characters. We have an opportunity of observing among the specimens in the collection of the Society, how far the bill of this extraordinary genus combines the different forms of that of the two genera, and how far the legs, still maintaining the characteristics of *Caprimulgus*, such as the unequal length of the toes, are related to those of *Strix* by their superior robustness. Here, indeed, there is a beautiful gradation of affinities. All the front toes of *Caprimulgus* are united by a connecting membrane as far as to the first joint: those of *Strix* are divided to the origin; while those of *Podargus* partake of the characters of both, in having the middle toe connected

which the serration can be applied. There are many other groups of birds, possessing the same character, to which the same application of it can never be assigned. We may observe, for instance, that the greater part of the genus *Pelecanus* of Linnæus possess this character. This group of the *Natatores* meets the *Birds of Prey*, as we shall have occasion to observe hereafter, on the opposite side of that circle which embraces the whole class: and thus on both sides of the order we find a similar construction in the groups immediately approaching it. Many of these birds, whose feet are naturally ill adapted by their webbed structure for laying hold of any object, are yet found to incubate among trees, where the serrated claw may give them a firmer power of prehension: they are also asserted to seize their prey occasionally by the foot; in which act the structure of the nail, as in the case cited from Mr. White respecting the *Caprimulgus*, may be peculiarly useful.—See p. 418. Notes * and †. The family of *Ardeidæ* among the *Wading Birds* equally exhibit an analogous construction in the middle nail. Here, again, this character seems adapted to their mode of life in enabling them to hold their prey more firmly in those slimy and muddy situations where it might otherwise elude them: while, at the same time, it may assist their feet, (which, like those of the *Pelecanidæ*, are naturally ill suited for grasping,) in their hold among the trees, where, like some also of the latter family, they build their nests.

* “*Rostro minimo nigro, Rictu oris ingenti, Pedibus brevibus exilibus ab aliis quibuscunque Noctuis abunde distinguitur.*” *Raii Syn. Av.* p. 27.

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with the outer, but divided from the inner. Again, as I have already remarked, *Caprimulgus* has the nail of the middle toe dilated and serrated: *Strix* has it, generally speaking, undilated and entire at the margin: but in *Podargus* the same part displays the singular dilatation of the one, and the marginal integrity of the other. It is difficult to say to which of these groups it comes nearest, until further and more accurate accounts than we at present possess of its food and economy may determine its actual situation. At present* it remains osculant between the two families, and may decidedly be pronounced the immediate passage from the *Birds of Prey* to the *Perchers*.

The family of *Columbidæ*, alternately arranged by systematic writers among the *Perching* and *Gallinaceous* orders, and not unfrequently grouped as a separate order between the two, at once indicates where the point of junction exists between them. These birds, although we have the high authority of Linnæus for uniting them with that division of our *Perchers* which form his *Passeres*, I do not hesitate in arranging, conformably to the opinion of MM. Cuvier and Illiger, as a subdivision of the GALLINACEOUS BIRDS. In those particulars, where they respectively assume the character of each order, their affinity with the latter is considerably stronger than that which approximates them to the former. Their food and habits, their internal economy, and the formation of their bills, identify† them with the *Rasores*. While, on the other hand, the characters which bring them near

* From the accounts which I have latterly been enabled to obtain from actual observers of some of these birds in New Holland, their manners are generally conformable to those of the *Caprimulgi*.—Nov. 1824.

† “Comme les premiers (les *Gallinacés*) ils ont le bec voûté, les narines percées dans un large espace membraneux et couvertes d’une écaille cartilagineuse qui forme même un renflement à la base du bec; le sternum osseux profondément et doublement échancré, quoique dans une disposition un peu différente, le jabot extrêmement dilaté, le larynx inférieur muni d’un seul muscle propre.” Cuvier, *Regne Anim.* i. p. 454.

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the *Insessores*, their divided toes and comparatively short legs, are weakened by the resemblance which those members bear to the same parts of the contiguous order in their general structure, and more particularly in the bluntness of the nails, so strongly indicative of the rasorial* habits of the *Gallinaceous* tribes, and so strikingly contrasted with the sharpness of the nails in the Linnean *Passeres*. They are much more nearly allied to these latter tribes by their habits of perching and building their nests in trees or rocks, by the absence of the spur on the legs of the male, and by the inferior number of their tail-feathers. But these characters are equally found in a group of birds, confessedly gallinaceous; namely, the genus *Crax* of Linnæus, which meets them at the opposite extremity of that order. Such points of resemblance, in fact, although not sufficiently strong to assign them a place among the *Perchers*, are yet sufficiently

* The family of *Columbidæ* is one to which I have of late paid particular attention, and in the details of which I have found a singular affinity with the other *Rasores*, that will not admit of their being disjoined from each other. The nature of my present observations, too general to allow of my descending into particulars, prevents my dwelling on the subject at present. I shall, however, extract a reference or two from a popular work of the first authority, to evince the approximation in manners to which I allude. Dr. Latham, speaking of the *Columba Nicobarica*, observes: "It is a heavy bird, with rounded wings, and keeps on the ground in the manner of other poultry, and like them feeds on grain, but occasionally eats insects and all kinds of worms; will mix with other poultry, and roost with them on the trees at night: *they fly heavily and not a great way at a time, but run on the ground sufficiently fast.*" *Syn.* vol. viii. p. 85. ed. 2.—Of *Columba carunculata* he says: "Its nest is made on the ground. The young as soon as hatched are covered with grey down, and keep with their mother, who covers them with the wings like a hen: these keep all together till they pair for a new brood; in this, following the nature of other gallinaceous birds. The young run on the ground like partridges, and the old ones call after them as a hen does her chickens." *Ib.* p. 86.—Of *Columba passerina*: "Sloane mentions that these birds feed on the ground as partridges, and spring as they do, taking a short flight, and again alighting on the ground." *Ib.* p. 92. These quotations will be sufficient to direct the judgment of those who may be inclined to form their opinion of the manners of the *Columbidæ* from those of our European species.

decisive of their affinity to them ; and it is by means of these characters that the passage from one order to the other is preserved. If we now look among the *Insessores* for that tribe which approaches most closely to the *Rasores*, we may select the singular African family consisting of the genera *Musophaga* Isert, and *Corythaix* Ill., which the accurate hand of M. Cuvier has already marked out as uniting the two orders. The internal structure of these birds, at least of the latter genus, has been decided* by that discerning anatomist to be the same as that of the *Perchers* ; and from their toes being arranged in pairs, although like those of many of the same tribe they are said to be retractile, they may be assigned a place among his *Grimpereaux*, or our tribe of *Scansores*. Their food and habits, and indeed their general appearance, on the other hand assimilate them to the *Rasores*. The well-known genus the *Touraco* of M. Le Vaillant approaches some species both of the *Cracidæ* and the *Columbidæ* by its bill ; while the tail and wings of both *Musophaga* and *Corythaix* exhibit the exact form of the former family, or of the Linnean genus *Crax*, which meets the family of the *Pigeons* at the opposite extremity of the *Gallinaceous* order. It is consequently at this point of junction between the families of *Columbidæ* and *Cracidæ*, by means, as we shall see hereafter, of the genus *Penelope* of Merrem, that the second and third orders appear to be naturally connected.

In pursuing the same line of inquiry, and exploring the passage from the *Gallinaceous* to the *Wading* orders, we may remark a striking character in one of the groups of the former, which immediately suggests the union between them. The tribe of *Cursores* of Illiger have their affinity to the *Wading Birds* indicated by the length of their legs and their nakedness above the

* " Leurs narines sont aussi simplement percées dans la corne du bec,—et le sternum (au moins celui du *Touraco*) n'a pas ces grandes échancrures ordinaires dans les gallinacés."—*Regne Anim.* i. p. 435.

knees :

knees : while their habits, entirely terrestrial, and for the most part confined even to arid situations, keep them apart from those birds which affect the neighbourhood of waters. They are met, on the other hand, by a group among the *Grallatores*, the family of *Gruidæ*, which, though decidedly *Waders*, and living in moist places, have their food more vegetable, and their habits more terrestrial, than the other families of the same order*. The *Gruidæ* also may be observed to retain that peculiar looseness and delicate texture of plumage which are conspicuous in the gallinaceous tribe, from which they immediately recede, and of which the *Struthio* of Linnæus may be considered the type. In that singular genus by which we enter among the *Waders*, the *Psophia* of Linnæus, this affinity is obviously discernible. In form and plumage it at first sight appears an *Ostrich* in miniature ; while it retains the brilliancy and changeableness of colour natural to the gallinaceous tribes, but so distinct from the sober hues of the *Waders*, that it alone of the order is found to possess them. I feel some hesitation indeed in saying to which order it actually belongs, until dissection determines the point. As yet the accounts we have of its manners, although not sufficiently satisfactory, would induce us to rank it with the *Gruidæ*, to which its habit of standing in its sleep on one leg and drawing in its head between its shoulders, seems particularly to assimilate it. It may here be added, that the family of *Charadriadæ*, which meets the *Gruidæ* at the other extremity of the order of *Grallatores*, bears a considerable affinity to the *Struthionidæ*, or cursorial subdivision of the gallinaceous birds, in the conformation of their feet. Both are distinguished from the remaining families of their respective orders by the absence of the hinder toe ; a character which may be observed to be carried to a still

* “ Leurs habitudes sont plus terrestres, et leur nourriture plus vegetale que celle des genres suivans. Aussi ont elles un gésier musculeux et des cæcums assez longs.”—*Cuvier, Regne Anim.* tom. i. p. 471.

greater extent in the type of the *Struthionidæ*, where one of the front toes is also deficient. This character, which indicates the habit of running, brings the *Charadriadæ* in a natural arrangement into close contact with the *Struthionidæ*. So that we may at once decide that the passage from the *Gallinaceous* to the *Wading* order takes place at that point where the two extreme subdivisions of the latter are united, as we shall shortly observe, by the genera *Œdicnemus* of Cuvier and *Psophia* of Linnæus. The genus *Otis*, Linn. seems to be the group among the *Rasores* that immediately meets them.

The two conterminous orders, *Grallatores* and *Natatores*, forming, when united, a division of the entire class, which may be entitled *Aquatic Birds*, it may readily be concluded that they approach each other by such gradations as render it no easy task to fix the exact limits of each. This is so much the case, that the most obvious characters of each order are in many instances transferred to groups of the other. Thus we find the webbed feet of the *Natatores* among birds which do not swim, as, for instance, the *Recurvirostra*, Linn., and *Phænicopterus*, Linn. On the other hand, we have groups which do swim, such as the genera *Rallus*, Linn., *Gallinula*, Briss., and *Hæmatopus*, Linn., and which yet possess the divided toes of the *Grallatores*. Again, we may observe other Swimming Birds, such as the lobated *Fulica*, Linn., and *Phalaropus*, Briss., the feet of which may be said to be neither webbed nor divided, but to partake of each character. Various modes of classing these birds have consequently been adopted by systematic writers. Linnæus has placed the before-mentioned genera *Phænicopterus* and *Recurvirostra* among his *Anseres*, or our *Natatores*. But the character of their webbed feet is neutralized by the extreme length and forward position of their legs, which totally prevent their swimming: and these latter characters, together with the nakedness of their thighs and their habits of life, decidedly place them among the *Grallatores*.

To

To these birds we shall hereafter observe them united by intermediate genera, which partake in a lesser degree of the character of the palmated foot. In fact, the webbed feet of the *Flamingo* and *Avocet* appear to me to connect them with the *Natatores* by a relation of analogy rather than of affinity. These birds are the extremes of the groups to which they belong. Both deviate from the habits of their own tribes, by gaining their sustenance on the sea-shore or at the mouths of great rivers, and thus become more pelagic in their manners than their congeners. It is not, consequently, to be wondered at, that they should assume a conformation in a subordinate degree analogous to that of the true oceanic birds, to whose sphere of life they approach. These two groups being on the whole so widely different in their chief characters, it is not among them that we may expect to find the passage between the two *aquatic* orders. We shall perceive it more strongly indicated by the lobate-footed *Fulica*, which recedes from the *Grallatores* and approaches the *Natatores*, not only by the rudiments of the web that partially fringes the toes, but by its habits of swimming. I cannot, however, agree with the views of those writers, who place this genus among the true *Natatores*, and form it into a subdivision of that order in conjunction with the genera *Phalaropus* and *Podiceps*: much less can I accord with that disposition which places these three groups, so dissimilar in manners, and even in the construction of the foot*, in a separate order of their own. *Fulica*, in a natural

* I know no two birds in which the construction of the foot, and the use to which it is applied, is more dissimilar than in *Fulica* and *Podiceps*, although they certainly belong to approaching groups. *Fulica* has the true *ambulatorial foot* of the *Grallatores*, with the rudiments of a web that exhibit a partial deviation from that order and an approach to the swimming powers of the *Natatores*. *Podiceps* has a true *natatorial foot*, and one in which the powers of swimming and diving are strongly developed, as will appear in the course of the succeeding observations. The hind toes of both these genera are totally unlike: while the different position of their legs evince the extreme distance between their respective stations among the birds that swim; one group belonging to the

natural arrangement, cannot be placed in a different family from *Gallinula*, nor *Podiceps* in a different one from *Colymbus*. It is not easy, I must confess, to draw a decided line of partition between orders so closely assimilated as the *Grallatores* and *Natatores*. Perhaps the plan most accordant with nature would be to divide the above Aquatic Birds, according as they frequent the fresh or inland waters, or generally inhabit the ocean. The approaching groups of each division would of course partially encroach upon the domains of the other; and while the extremes of the oceanic birds would be occasionally found in inland stations, those of the grallatorial birds would sometimes, on the other hand, gain their support from the ocean, but on the sea-shore, or not far distant from land. Such a view would go far to restore the genera *Fulica* and *Phalaropus*, whose station has been so often disputed, to their original place among the *Waders*, where they were arranged by Linnæus. We may thus observe, that the family of *Grallatores*, which approaches the *Natatores* by their swimming habits, will lead on in a regular succession from *Rallus*, Linn., to *Gallinula*, and *Porphyrio*, Briss.; thence to *Fulica*, Linn., and *Podoa*, Ill.; which last genus exhibits a striking approach, in the general construction of its neck, body and tail, to the family of *Anatidæ*, that forms one of the extremes of the *natatorial* birds. Some of these, on the other hand, as the genus *Anser*, evince in the length of their neck and *tarsi* and the forward position of their legs, together with a greater compression of bill than is found among the *Anatidæ* in general, a corresponding approach to the *Rallidæ*, or extreme subdivision of the *Grallatores*. The genus *Ce-*

the typical oceanic or true swimming and diving birds, the other to those which barely approach them. The system which, without regard to their general structure, unites these discordant groups into one, and separates them from all other birds,—merely because the webs that border the toes, although not even similar in construction, (for in one group they are emarginated, in the other entire,) *are not united*,—is the most artificial with which I am acquainted.

reopsis

reopsis in particular evinces still more this affinity. Here the thighs are naked above the knee, as in the genuine *Waders*. And this character, as well as many other particulars in its appearance in general, so far connects it with both orders, as to have caused different systematic writers to place it in each. It may here be observed, that the genera which compose the natural family of *Rallidæ*, are closely allied to the *Hæmatopus*, Linn., which commences the adjoining subdivision of the *Waders*. They are also brought, by means of the circular disposition, which I shall dwell upon more fully hereafter, into immediate contact with the *Tringa* of Linnæus, which terminates the family that precedes them. Here, by means of the lobated feet, they are connected with *Phalaropus*, which I arrange, as one of the extreme groups of the *Scolopacidæ*, close to the genus *Tringa*, where they were placed by Linnæus, and in which situation they are still retained by M. Cuvier. The whole of the swimming birds, therefore, which are to be found in the *Wading* order, are thus brought into contact and united by uninterrupted links of affinities.

We have now arrived at the fifth and last division of Birds, and have only to trace its connexion with the first, in order to complete the circle in which the orders have been asserted to be united. The difference between the types of the *Raptorial* and *Natatorial* groups is at first view as great as can be imagined. Frequenting different elements, and performing totally opposite functions in nature, they can scarcely be conceived capable of being brought within a common sphere of action; while the extreme discrepancy in the structure of their feet renders it at first sight difficult to conjecture how any modification of it can bring them into contact. These difficulties, however, vanish on a nearer inspection, and we find a gradual approximation take place between these apparently discordant groups, similar to
what

what has been before observed between the other orders. It is naturally to be supposed that those oceanic birds, which are likely to approach most closely to the raptorial tribes, are to be found among the extremes of the *Natatores*. And in tracing the gradations by which the natatorial families recede from those which may be considered typical of the order, we may perceive in the genus *Pelecanus* of Linnæus an evidently approaching affinity to those birds whose feet are formed for grasping. The greater part of this family, although generally resorting when on land to rocky sea-shores, and forming their nests among rocks, are yet occasionally accustomed both to perch and incubate among trees*. Unlike all the other webfooted tribes, they are equally asserted to make use of their feet in laying hold of their prey†. And I cannot here pass over the striking circumstance of the *Cormorant* having been formerly used for fishing‡, in a similar manner to that in which hawks are used by falconers on land; and of a species of the family, the *P. Sinensis*, being trained by the Chinese for the same purpose. In two genera of this family, the *Phaeton*, Linn., and the

* “Quamvis palmipedes sunt (sc. Onocrotali) et mole corporis maximâ, arboribus insident in iisque nidificant, teste du Tertres in *Hist. Nat. Ins. Antill.*, quod et Corvi aquatici et Graculus palmipes, nostrâ experientiâ, faciunt, et reliquæ fortasse hujus generis aves.”—*Raii Syn.* p. 122. “Ces Oiseaux (les Cormorans) sont excellens nageurs: quoique tous les doigts se trouvent engagés dans une même membrane, ils sont doués d’un moyen de prehension très-extraordinaire dans des oiseaux à pieds palmés, en ce qu’ils perchent souvent sur les arbres.”—*Temminck, Man. d’Ornith.* p. 890. “La famille de *Totipalmes* a cela de remarquable, que leur pouce est reuni avec les autres doigts dans une seule membrane, et malgré cette organisation qui fait de leurs pieds des rames plus parfaites, presque seuls parmi les palmipedes, ils se perchent sur les arbres.”—*Cuvier, Regne Anim.* i. 522.

† “Gesner reports that the feet do sometimes serve them (the Cormorants) to catch the fish.”—*Pitfield, Nat. Hist. of Animals*, p. 135. “In passing, he (the Frigate Bird) takes up the little fish either with his bill or talons.”—*Albin*, iii. 75.

‡ See *Penn. Brit. Zool.* vol. ii. p. 283. ed. 8vo. 1812.; and *Willoughby, Orn.* p. 329.

Tachypetes, Vieill., we find a still more immediate approach to the *Birds of Prey**, in their raptorial habits, their soaring and aërial flight, and the rapid seizure of their prey without immersing themselves in the waters whence they seek it. The last-mentioned genus, *Tachypetes*, in particular, exhibits in its general habits and structure the most conclusive evidence of this affinity, and of its deviation at the same time from the *Natatores*. Although for the most part it pursues its habits of rapine at immeasurable distances from the shore, and derives its support exclusively from the ocean, it is never known to rest upon its surface. It does not possess in fact, to a sufficient extent, those glands which by their oily secretions preserve the plumage of other oceanic birds from the effects of the water; while the extreme disproportion of its hinder extremities deprives it of the power of either swimming† or walking. On observing the structure of its legs we immediately detect this deficiency. Short, weak, and feathered down to the toes, they are equally unsuited to the land and the water. Its powers of motion and the characters by which it maintains its station in nature are in fact centered in its wings. Supported in its unlimited flights by the strength and expansion of these members, and aided by the singular mechanism of its tail and the buoyant nature of the inflated sac which distends its throat, it seems to be an inhabitant of the air, rather than of the land where it resorts alone for the duties of its nest, or of the water over which it only hovers for its prey. These extraordinary and strongly marked characters, by which it thus appears as it were to fluctuate between the confines of the two

* *Fregata avis* — Oculi nigri, acie acutissimâ et *Aquilinâ*. — Pedes breves; ungues *Vulturini*. — A ramis arborum in quibus resident difficulter admodum se levant: verum cum semel in sublime evolârunt, motu placido absque ullâ fere alarum agitatione aërem tranantes videas velut fluxu aut lapsu quodam, *ad instar Milvorum*. — *Raii Syn.* p. 153.

† See *Linnean Transactions*, vol. xiii. p. 3.

orders before us, did not escape the penetrating eye of Linnæus, who, by the name of *Pelecanus Aquilus* which he assigned it, pointed out at once its place among the *Aquatic* birds, and its vicinity to the *Aquiline*. It is by no means so easy to determine the point where the *Raptores* meet it, as to detect its own general affinity to that order. We know, perhaps, less of the raptorial tribes than of any order in the whole class, notwithstanding the importance of their size and the prominence of their habits. Several groups in particular, of which we have very unsatisfactory descriptions, are known to exist in the New World. In this imperfect state of information,—having had few opportunities of examining any of these birds in question, or of judging of them by so accurate a description as we fortunately possess of the *Tachypetes*,—I hesitate to decide with any confidence, where I can only speak from conjecture. All that I shall at present insist on is, the general approximation of these two leading groups. They evince a decided affinity in the more important of their habits and characters; and I make no doubt that, when our knowledge of the *Raptorial* order becomes more enlarged and defined, we shall find the chain of affinities as perfect in the minuter particulars that connect these groups, as it is between the other similar divisions of the feathered race.

ON THE FAMILIES OF BIRDS.

Ord. I. *RAPTORES*.

In descending from the consideration of the more extensive divisions or orders of Ornithology to that of the next succeeding subdivisions, we are naturally led to the consideration of the families of the *Raptores*, the first of the two orders that form the normal or typical group of the class. And here I have to regret that

that the tribes which meet our earliest attention are those respecting which our information is most deficient; and where, consequently, we must feel most hesitation in deciding on the affinities which connect them, and the subdivisions into which they branch out. I shall not therefore at present dwell at much length upon this order, but shall content myself with a few brief observations, more particularly on such of the groups as containing European species, and being of course more open to examination, may be spoken of with some degree of confidence.

There are three important groups in this order, which form distinct and prominent subdivisions of it; the families of *Vulturidæ*, *Falconidæ*, and *Strigidæ*, corresponding with the Linnean genera *Vultur*, *Falco*, and *Strix*. To these may perhaps be added a fourth group, the *Gypoggeranus* of M. Illiger, which, though it has sometimes been disposed in a different order, is now, I believe, generally admitted to be a *Bird of Prey*. In this arrangement I feel every disposition to acquiesce. The essential characters observable in the structure of the *Gypoggeranus* accord accurately with those of the *Raptores*; and it bears a resemblance to the *Grallatores*, among which it is sometimes arranged, only in the length of its *tarsi*. But in judging by such insulated characters, however striking or important, as only indicate a similarity between groups not otherwise connected together by equally essential particulars, it becomes necessary to consider whether the conformity of these characters may not be the result of a conformity in habit or situation, which may incidentally assimilate the groups in which they are found, rather than of a natural affinity that determinately unites them. In other words, we ought to reflect whether an analogous mode of life or an analogous place of resort may not give rise to a partially analogous conformation. In the present case, the sandy and unsubstantial nature of the plains which these birds frequent, appears to me to demand

a corresponding structure with that required by the moist places which form the ordinary resort of the *Waders*: and the *Bird of Prey*, that pursues its reptile food over the loose and unstable footing of the desert, seems to stand in need of a length of limb equal to that which is necessary for the *Wader* among the marshes. Other instances occur of an analogous provision of Nature. The *Ostrich*, whose chief abode is among the barren plains of the torrid zone, is endowed with a similar length of limb: and the *Giraffe*, that tallest work of the animal creation, is exclusively confined to the limits of the same sandy regions. While on this subject, it may also be observed that the legs of the *Gypogeranus*, although similar to those of the *Waders*, are not the same with them in structure. Those of the former bird are plumed, like the legs of the *Raptores*, as far as to the knee; while in the *Wading Birds* they are devoid of feathers: the dry nature of the sands not requiring the same nakedness of limb in the one group, which the moistness of the marshes renders necessary in the other. The genus *Gypogeranus* is at present composed but of one species, the well-known *Secretary Vulture* of the Cape. But judging from its structure and habits, and the adaptation of both to the arid nature of the plains which it frequents, it appears probable that some congeneric birds may exist in the hitherto impenetrable deserts of that vast continent, on the outskirts of which this solitary species is found. I have some doubts also whether a part of the raptorial birds which have been noticed in South America may not be allied to this genus. M. Illiger alludes to some Brazilian *Falconidæ* with long *tarsi*, which do not seem to have met with much attention, or to have been very accurately described. These may perhaps be found to fill up part of the vacancy which at present exists in our series of affinity. But all this is mere conjecture; and it is useless to hazard observations which only tend to expose the narrowness of our information,

tion, and the insufficiency of the *data* which are afforded us on such points, for forming any decisive conclusions.

If we admit the *Gypoggeranus* among the *Raptores*, we may arrange it, I conceive, next the *Vultures*, to which family it bears a nearer affinity than to the *Falconidæ*, in its naked cheeks and the looseness of the plumage about the head. The construction of the feet also brings it more close to the *Vultures*, while the comparative straightness and bluntness of its toes distinguish them from the hooked and pointed talons of the *Falcons*. The greater developement of the membrane which connects the toes affords an additional reason for placing it near the *Vulturidæ*. Its natural station, therefore, appears to be immediately preceding this family, from which indeed it seems only to deviate in the length of its *tarsi* and its reptile food.

Passing on now to the succeeding families of the order,—the affinity between the *Vulturidæ* and *Falconidæ* may with equal confidence be asserted, from the circumstance of several species of each being indiscriminately arranged in both families by different systematic writers. The external characters of these neighbouring groups are indeed considerably blended together. The long bills of the *Vultures*, straight at the base and hooked only at the point, pass over into many groups of the *Falconidæ*; while some species of the latter family, which from their manners cannot be separated from it, exhibit the naked face and loose plumage that characterize the *Vultures*. Of this, the *Falco Novæ Zealandiæ* of Dr. Latham affords a notable instance; and more particularly his *Falco Braziliensis*, another of the Fishing Eagles, forming the genus *Polyborus* of M. Vieillot, where the throat is devoid of feathers, as well as the cheeks. The genus *Gypaetus* of Storr, of which the *bearded Vulture* of the Alps presents the type, appears to form the connecting link between the families. Here, not merely the details of the bird's structure partially correspond with those of the conterminous groups, but in manners
also

also it agrees with each ; the bird being occasionally observed, like the *Vultures*, to feed upon carrion, and at other times, like the *Falcons*, to pursue a living prey.

If we search in the last place for the connexion between the *Falconidæ* and the *Strigidæ*, we shall not fail to find their affinity apparent, as is usual, in the less typical part of the two groups. In the latter family some species may be observed gradually approaching the *Falcons* in their diurnal habits and the lateral position of the eyes ; and at the same time deserting their own congeners in losing the large orifice to the ear, the disk that surrounds the face, and the egrets that decorate the head of the type of the family. The genus *Surnia*, Dumer., which includes the "*Chouettes Eperviers*" of the French naturalists, is the most accipitrine of the group. In addition to the approximation already pointed out, the bill and tail of this genus, more lengthened than those of the *Owls* in general, give it a still stronger resemblance to the *Falconidæ*. The group of *Buzzards* among the latter family appears to come most closely to the *Owls*, in their slow and heavy flight, the softness of their plumage, and their slothful and cowardly habits. The genus *Circus* of Bechstein in particular, of which our *Hen Harrier* gives a familiar example, may be observed to possess a peculiar elongation and erection of the face-feathers, which bears some resemblance to the disk that encircles the face of the *Strigidæ*, and it may therefore be particularized, from among those groups, at least, which are most known to us, as exhibiting the nearest approach to *Surnia*.

There is thus little difficulty in selecting the four families just mentioned for the purpose of filling up the place of four of the subdivisions of the *Raptores* ; and in all probability, when the order comes to be more perfectly and accurately understood, these families will be found to be connected together in the succession in which they have now been examined. A fifth subdivision as yet is wanting. That there is room however for such an additional group,

group, may be inferred from the intervention of so great a chasm as that which separates the *Strigidæ* from *Gypogeranus*, and indeed from every other known group of the order, except the *Falconidæ*, with which it has been seen to be connected on one side. It may also be observed that it is near the point where this chasm occurs that we may look for the group which immediately meets the *Tachypetes* and the Natatorial families; the general approximation of which to the *Raptores* we have already remarked, although the immediate point of junction between them could not be determined. Whether such a group may be discovered among those birds which have already been noticed by voyagers, but which are vaguely and imperfectly described; or whether it may exist, hitherto entirely unknown, in the heart of those regions which the eye of science has not yet explored,—is a point on which we can of course at present only speculate, without any more solid foundation than conjecture. I shall therefore reserve all further observations on the subject, until more extensive opportunities and more accurate examination, than I can at present have recourse to, will enable me to lay more decisive results before this learned body; and I shall now merely suggest the following attempt at arranging these families according to their affinities.

Structurâ magis ad rapinam idoneâ; prædâ superiore.	{ <i>Vulturidæ</i> . <i>Falconidæ</i> , Leach.
Structurâ minus ad rapinam idoneâ; prædâ inferiore.	{ <i>Strigidæ</i> , Leach. <i>Gypogeranidæ</i> ?

Ord. II. INSESSORES.

The order of *Insessores*, which next attracts our attention, contains, as is usually the case in typical groups, a considerably greater

greater number of forms than are to be found in any of the other orders. The families of which it is composed are consequently very numerous, and require to be classed in comprehensive sections, or, as I shall call them, tribes, which form the primary subdivisions of the order. These tribes may be denominated as follows, according to the habits or the modes of structure that characterize the birds which compose them :

* *Fissirostres*, Cuv.

Dentirostres, Cuv.

Conirostres, Cuv.

Scansores, Auct.

Tenuirostres, Cuv.

* In enumerating or describing the groups which compose different series of affinities returning into themselves, it is of no consequence with which group in the series we begin our examination, provided we preserve an uniformity among the whole of our corresponding series. This consideration, however, should be particularly attended to, for the sake of more easily discerning their parallel analogies. It is generally my custom, in examining a group, to view it with its more perfect or typical form in the centre, as above, and with its less perfect forms on each side. This mode affords some advantage, by presenting us at first sight, when we enter upon a group, with that subdivision of it which is immediately connected with the group we have quitted. Mr. W. S. MacLeay in his "*Horæ Entomologicæ*" has adopted a different, and certainly a more scientific mode of exhibiting the series of affinities. He divides the whole series into two groups, which he calls *normal* and *aberrant*; and, commencing with the two subdivisions that form the normal group, he ends with the three that compose the aberrant. For the more entire comprehension of my subject, I shall exhibit the different series that come before us according to both these methods, adopting that method in the notes which has not been followed in the text. The following is the arrangement of the *Insectores* according to Mr. MacLeay's plan of exhibiting a series of affinities.

<i>Normal group.</i>	
Rostri pedisque structurâ magis perfectâ	{ Dentirostres.
	{ Conirostres.
<i>Aberrant group.</i>	
Rostri pedisque structurâ minus perfectâ	{ Scansores.
	{ Tenuirostres.
	{ Fissirostres.

§ 1. FISSIROSTRES.

The families which compose the first tribe are distinguished from those of all the others, except the *Tenuirostres*, by their habit of feeding on the wing. From the latter, or the *Suctorial Birds*, which meet them at one of the extremes of the tribe, and of which the typical families feed also on the wing, they are distinguished by their animal food, which they take by their bills, or in the gape of their mouths; while the *Tenuirostres* live chiefly upon vegetable juices, which they extract with their tongue. The *Fissirostres*, depending so much on the powers of their wings, exhibit a proportional deficiency in the strength of their legs. These members are not only shorter and weaker than in the other *Perchers*, (the typical families of the *Tenuirostres* here again being excepted, which correspond with them in this particular also,) but they have their external toes in general to such a degree united with the internal,—for the most part as far as to the second phalanx,—that they are deprived of the free play of the joint: and the bird is thus rendered nearly incapable of using its legs in walking, or for any purpose besides that of mere perching. But even in this particular a group of the typical family appears deficient: for the toes of the genus *Cypselus* being all placed in front, seem to assist the bird only in suspending itself, where other birds would perch. All the families of the tribe are again united by a striking conformity in their mode of nidification. They deviate from the manners of the *Perchers* in general, in forming their nests on the ground; or if, like some of the *Hirundinidæ*, they choose elevated situations for that purpose, they build up the exterior of their nests with earth cemented into a solid substance, and thus preserve a similarity in their construction to those nests which are actually formed on the ground. The two typical groups of this tribe may be observed to be separated from the other three by the shortness of their bills and the wider gape of the mouth.

Merops becoming shorter as they approach *Hirundo* ; while those of some of the latter group partially desert their own type, and by degrees assume the lengthened form of the bill of the *Bee-Eaters*. The tail of *Merops*, again, is equally found to desert the typical character of the group, namely, the greater length of the two middle feathers, in order to become even in some species, then slightly forked, and at length to be identified with the fully-forked tail of *Hirundo*.

In continuing to trace out the same line of affinities between the succeeding groups, it is unnecessary to enter into a detail of those characters which unite the two families of *Caprimulgidæ* and *Hirundinidæ*. The union between them in the most essential particulars, in their habits, economy, and general conformation, is too evident to the common observer, and too universally acknowledged by scientific writers, to need any further illustration. It is gratifying, however, to observe, how even in minute particulars a gradual succession of affinities imperceptibly smooths the passage between conterminous groups ; and I cannot pass over without remark, the circumstance of the hind toe of *Caprimulgus* being usually retractile, which enables it to place all its toes in front, in a similar position to that which they maintain in *Cypselus*, where the family of the *Hirundinidæ* terminates. The conformation of the tail in the two families shows a similar affinity. Some species of *Caprimulgus* lately arrived from Brazil, exhibit the forked tail of *Hirundo*, one of which indeed, the *C. psalurus* of M. Temminck, has this character developed to an almost disproportionate degree.

Leaving those typical families with the short bill, and taking a general survey of the tribe, we may perceive that the *Caprimulgidæ* unite themselves to the longer-billed families by means of the Linnean *Todi*, which preserve the broad base of the bill of the latter, but lead on by the comparative length of that member to the succeeding family of *Halcyonidæ*. If we compare the bill of

the type of the last-mentioned genus, the *Todus viridis**, Linn., with those of *Caprimulgus* and *Halcyon*, we shall perceive that it stands exactly mid-way between them in the relative proportions of strength and breadth which it bears to each. In the length also of the tail, an important character in the groups that feed much upon the wing, it maintains a middle station between them. For the group which forms the immediate connexion between the present family of *Todidæ* and the preceding *Caprimulgidæ*, we are indebted to the zeal and scientific acumen of one of the most distinguished members of our Society ; since in the depressed and broad-based bill and wide gape of the *Eurylaimus* of Dr. Horsfield, we recognise the characters which unite the families before us. The intimate approach of the bill of this latter genus to that of *Podargus*, which meets it among the *Caprimulgidæ*, may be at once ascertained by a reference to the valuable plates† of the “*Zoological Researches in Java*,” in which both genera are figured. Near to *Eurylaimus*, which is united to *Todus* by some species now referred to the former genus, but which were originally included in the latter,—among which *T. nasutus* of Dr. Latham may be specified,—I would place the genus *Eurystomus*‡ of M. Vieillot, which in the essential characters of the bill, and from all we can ascertain of its general habits and economy, seems

* The following extract, from the “*Regne Animal*,” contains the greater portion of the information which we possess concerning this species : and I quote it the more willingly, as it shows the affinity which the bird bears to the groups among which I have placed it : “*Les Todiers sont de petits oiseaux d’Amerique, assez semblables aux Martin-pêcheurs pour la forme generale, et qui en ont aussi les pieds et le bec allongé, mais ou ce bec est aplati horizontalement, obtus à son extrémité, le tarse plus élevé, et la queue moins courte. Ils vivent des mouches, et nichent a terre.*”—Cuvier, *Regne Anim.* i. p. 417.

† The plates referred to are in the second number of that work.

‡ This is the genus *Colaris* of M. Cuvier ; but I adopt the name of M. Vieillot in preference to that of the former distinguished writer, inasmuch as the “*Analyse*” of the latter naturalist, in which the genus is characterized and named as above, was published in the year 1816, whereas the “*Regne Animal*” did not appear until the year following.

Since

seems to bear a striking affinity to the present group. Here also the same considerations would incline me to arrange the *Calyptomena* of Sir Stamford Raffles, which differs chiefly from the groups now mentioned in its comparatively shorter bill, and the singular covering of plumes that project over the upper mandible. All these, and some other corresponding genera will be found, I make no doubt, on more accurate knowledge of their economy, to belong either to the present family, which is placed at the extremity of the *Fissirostres*, or to that of *Pipridæ*, which forms one of the aberrant groups also of the neighbouring circle of *Dentirostres*, and thus comes in contact with the *Todidæ* now before us. More extensive knowledge respecting these birds will determine the line of demarcation between them; but the general affinity by which they approach each other, at least in conterminous families, may at once be decided without hesitation.

If we examine the genus *Todus* of authors with reference to its general affinities, we shall find an intimate resemblance between it and the succeeding group of *Halcyonidæ*; since the only species now known in that genus exhibits the exact representation of a *Kingsfisher*, with the exception of a shorter and more depressed bill. We are thus conducted to the *Halcyon** of Mr. Swainson, and from thence to the *Dacelo* of Dr. Leach;

Since the above observations were read before the Society, I have been strengthened in my opinion, that the place I have assigned this genus is likely to be correct, by some accounts which I have received of the manners of these birds from Mr. Caley, to whose exertions in New Holland the Society is indebted for its valuable Australasian collection. He informs me that "they are birds of passage; that they make a chattering noise somewhat like the *Goatsucker*; and that they feed upon the wing on insects." It may be here added, that these birds, together with *Eurylaimus* and *Todus*, evince an approximation in their general colouring to the singularly brilliant plumage that prevails throughout the *Halcyonidæ*. Nov. 1824.

* *Zoological Illustrations*, Pl. 27. This is an extremely distinct and well-defined genus. It were, however, to be wished, that the name of *Halcyon* had been retained to that group of the family which includes the European *Kingsfisher*, the bird known to the ancients under that name.

until

until we find, in the slenderer bill of *Alcedo*, an approaching conformity to the more delicately-shaped bills of the succeeding family of *Meropidæ*. In the present group of *Halcyonidæ* must be placed the genus *Galbula*, Briss., which, though distinguished from the present groups by its zygodactyle feet, and as such arranged by modern writers among the true *Scansores*, was originally included in the genus *Alcedo* by that great master of natural affinities, Linnæus, on account of the identity of the general structure and economy of both groups. Here it must necessarily be placed, if we look to natural affinity, rather than to the strict dictates of artificial arrangement; and with it, I fancy, may be placed some apparently conterminous groups*, of which the toes are equally disposed in pairs. The relationship of all to the true *Scansores* may be accounted for by the consideration of that tendency which opposite sides of a circle of affinity generally evince to approach each other. The very difference, however, between the feet of *Alcedo* and *Galbula*, (which two groups, at the same time it must be remarked, agree more intimately in every particular of the leg and foot, except the scansorial disposition of the toes, than *Galbula* accords with any of the *Scansores* in the same characters,) is lost in a species of *Galbula* which I have lately inspected from Brazil, where one of the hind toes is wanting, and where the foot thus exactly corresponds with that of the three-toed *Halcyonidæ*, or the genus *Ceyx* of M. Lacepede. That sin-

* I allude to the genus *Capito* of M. Vieillot, and some of its affinities. All these exhibit a decided approximation, in general appearance at least, to *Alcedo*, Linn. The kindness of Dr. Horsfield permits me here also to mention two new forms of scansorial birds which have lately been added to the collection at the India House from Sumatra. These in the old systems would be referred to *Bucco*, Linn. But the breadth of the base of the bill, which, although more lengthened, resembles that of *Eurystomus*, seems to bring them near to the present groups. If they should eventually be found to come among them, they will most probably unite the *Todidæ* to *Capito* and the other zygodactyle *Halcyonidæ*. In colouring also there is a strong similarity among all these birds. —But such remarks are mere conjecture. The relation in question, which I cannot however pass over without an allusion to it, may perhaps only be one of analogy.

gular and beautiful species of the Linnean *Alcedo*, the *Ternate Kingsfisher**, shows the equal approximation of that genus to *Galbula*, and a deviation from its own type. Its tail deserts the shortened character of that of the true *Kingsfisher*, and assumes the lengthened and graduated conformation of the same member in the *Paradise Jacamar*, and the other long-tailed *Galbulæ*. We have now arrived at the last family of the tribe, and look for that connecting affinity which will lead us back to that other family of it with which we commenced our observations. Here again the universally acknowledged relationship between the *Halcyonidæ* and the *Meropidæ* leaves me nothing additional to observe. The gradually attenuated bills of *Alcedo* and *Galbula*, and the increasing length of the tail in the latter genus, soften down the differences by which these families, united by general habits and economy, alone appear to be separated. The circular succession

* This beautiful species exhibits so strong a deviation from the *Halcyonidæ* in general, that it requires a separate station in the family: and I take this opportunity of characterizing the group as follows, under the generic title of

TANYSIPTERA.

Rostrum subbreve, subcrassum, rectum, acutum, naribus ovalibus.

Cauda gradata, rectricibus duabus longissimis.

DEA. *T. supernè intensè nigro-azurea, subtus alba; capite tectricibusque cæruleis: rectricibus albis cæruleo-marginatis, duabus mediis cæruleis apice clavato albo.*

Alcedo Dea. *Linn. Syst.* i. p. 181. 13.

Ispida Ternatana. *Briss.* vol. iv. p. 525. t. 40. f. 2.

Martin-Pêcheur de Ternate. *Buff. Pl. Enl.* 116.

The specimens of this species which are brought to Europe are generally deprived of their wings and legs. I am therefore prevented from referring to those members in my generic description. M. Pallas, it must be observed, asserts that the feet of this bird are zygodactyle, and as such he refers it at once to the genus *Galbulæ*. (*Spic. Fasc. vi. p. 10. note b.*) I am indebted to the kindness of Mr. MacLeay, the highly valued Secretary of this Society, for the above description, which I took from a specimen of this rare bird in his valuable collection.

of

of affinities by which the tribe of *Fissirostres* returns into itself may thus be considered as complete.

§ 2. DENTIROSTRES.

The depressed bill and insect food of the *Todidæ* introduce us at once to the *Muscicapidæ*, with which they are immediately connected by the genus *Platyrynchus*, Desm. The species that compose the latter group were originally included in the genus *Todus*, and were separated from it only on account of the comparative strength of their legs. The whole of the *Muscicapidæ* indeed, with which family *Platyrynchus* is now united, have a decided affinity to the last tribe, or the birds which feed upon the wing, in their broad-based bills, the *vibrissæ* that surround them, and their similar habits* of darting upon their prey while on the wing. Separated from them chiefly by the strength and more perfect structure of the leg and foot, they form the extreme of the succeeding tribe in which they are numbered in consequence of these distinguishing characters. The line of affinity between the two tribes may thus be assumed as established. The group upon which we now enter, corresponding for the most part with the *Dentirostres* of M. Cuvier, is distinguished by the notch near the extremity of the upper mandible, and its insect food. Besides the *Shrikes* and *Thrushes*, which by the superior strength and power of their bills appear to form the normal groups of the tribe, it contains the remainder of the "*Soft Bil'd Birds*" of Ray, which were not included in the families

* " Ils (les *Gobe-mouches*) se nourrissent uniquement de mouches et d'autres insectes ailés, qu'ils attrapent au vol."—*Temm. Man. d'Orn.* p. 150. " There is one circumstance characteristic of this bird (the *Fly-catcher*) which seems to have escaped observation; and that is, it takes its stand on the top of some stake or post, from whence it springs forth on its prey, catching a fly in the air, and hardly ever touching the ground, but returning still to the same stand for many times together."—*White, Nat. Hist. of Selborne*, p. 28.

of the preceding tribe. They appear to succeed* each other as follows :

Muscicapidæ.

Laniadæ.

Merulidæ.

Sylviadæ.

Pipridæ.

The family of *Muscicapidæ*, which first meets us as we leave the preceding tribe, contains a multitude of species, diffused over every quarter of the globe, and differing in many important points of generic distinction ; but hitherto so ill-defined, and so unsatisfactorily grouped, that any attempt to trace them in detail through their affinities in their present confusion, would be as hopeless as it would be foreign to the general views of this inquiry. They are all, however, well united together by the essential characters which distinguish the type of the group ; the notched, depressed, and angular bill, and the strong hairs or *vibrissæ* that surround its base. In these characters, as well as in their manners, they partially correspond with the *Laniadæ*, from the earlier families of which they chiefly differ in their inferior power and robustness.

Entering among the *Laniadæ* by the genus *Tyrannus*, Cuv., which unites them with the preceding *Muscicapidæ*, in which family indeed that genus has generally been classed, and from which I would separate it chiefly on account of the strength of the bill, wherein the character of a *Shrike* is more conspicuous

* In their typical disposition they may thus be grouped :

Normal group.	{	<i>Laniadæ.</i>
Rostris fortioribus		<i>Merulidæ.</i>
Aberrant group.	{	<i>Sylviadæ.</i>
Rostris debilioribus		<i>Pipridæ.</i>
		<i>Muscicapidæ.</i>

than that of a *Flycatcher*, we proceed by means of *Psaris*, Cuv., and *Artamus*, Vieill., to *Dicrurus**, Vieill., the fork-tailed Shrikes of the Old World, where the base of the bill is still depressed and wide, as in the groups we have just quitted, but the *apex* gradually more compressed. Hence we are led by some intervening forms to the still more compressed bills of *Sparactes*, Ill., and the true *Lanius* of authors, which by its short, compressed, and strongly dentated bill, exhibits the type of the family. Here we are met by some conterminous groups, among which *Falcunculus*, Vieill. is conspicuous. And hence we descend by intermediate gradations to the more lengthened and slender-billed *Vanga*, Cuv., together with *Prionops*, *Laniarius*, and *Thamnophilus* of M. Vieillot, which bring us in contact with the *Thrushes*. The extremes of the family will be found in the *Graucalus* and *Ceblepyris* of M. Cuvier, which by their bills, in some degree depressed at the base, lead back to *Tyrannus* and the other broad-billed groups which commence the family. This last-mentioned genus *Ceblepyris* has latterly been arranged with the *Thrushes*. But I feel inclined rather to leave it in its original station among the *Shrikes*, from the peculiarity of its tail-coverts, which form themselves into a kind of puffed-out cluster on the back. This character seems to prevail among the *Laniadæ* more generally and to a greater degree than in other birds: in one species of the family, the *puff-backed Shrike* of Africa, now rendered so familiar to our cabinets from our connexion with the Cape, this singular protuberance is carried to so great an extent as to form an apparently artificial appendage to the back. In the genus before us this peculiarity seems even still further developed in the well-

* This group is perhaps more generally known by the name of *Edolius*, which M. Cuvier has assigned it. I adopt the more ancient term, according to the suggestion of Mr. Swainson in his valuable observations on this family (*Zool. Journ.* vol. i. p. 303.), adhering to the inflexible law of priority. Nov. 1824.

known conformation of the same tail-coverts ; their shafts being elongated and projected beyond the webs, in stiff and sharpened points. On looking to the general affinity which the extremes of this family bear to the *Muscicapidæ*, and through them to the *Fissirostral* birds of the last preceding tribe, we may perceive the character of feeding on the wing carried on to the *Tyranni*, the fork-tailed *Dicruri*, and more particularly to the *Artami* or the *Piegrièches Hirondelles* of the continental writers ; while the depressed bill of the same *Fissirostral* tribe is partially preserved in the groups just mentioned, together with that of *Ceblepyris*, which meets them at the opposite extreme of the circle of affinity. The gradual manner in which Nature deserts any particular structure or mode of economy is in this, as in every other instance, strikingly and beautifully conspicuous.

The family of *Merulidæ*, connected as above with the *Laniadæ*, comprises a considerable number of species, and many natural genera ; but which, like most of the *Insessorial* groups, have hitherto received but partial examination. The general views by which they seem to be allied among themselves, as far at least as can be judged from their present unorganized condition, may be stated as follows,—but with that expression of doubt which ever attends inquiries like the present, where the absence of accurate information as to the economy of the subjects before us, and of extensive knowledge of the forms connected with them, leaves us no better foundation for our inferences than partial conjecture. The genus *Myiothera*, Ill. seems to be the first group of the present family which is connected with the *Laniadæ*, where it is met by some of the smaller species of *Thamnophilus**. This group

* I am happy to find these general views confirmed by the accurate examination which Mr. Swainson has made of the *Laniadæ*. The reader may see the line of connexion between *Thamnophilus* and *Myiothera* fully established by the intervention of several forms gradually passing into each other, such as the newly established genera

group seems to lead by *Pitta*, Vieill., and perhaps *Cinclus*, Bechst., through some intervening forms, to the true *Thrushes*, or the genera *Turdus* of authors and *Merula* of Ray, which form the type of the family. To these we may add that portion of the Linnean *Orioles*, which, possessing the curved and notched bill of the *Thrushes*, constitutes the genus *Oriolus** or true *Oriole* of the present day. Here we meet several groups, generally arranged without order in the Linnean genus *Turdus*, and hitherto entirely uncharacterized, which gradually lead from the typical groups to those which possess a more generally delicate conformation; until the comparatively strong form and robust bill of the *Thrushes* is lost in the weaker body and more slender bill of the *Warblers*. Here again the group of *Rock Thrushes*, of which the *T. saxatilis* is the type, appear to bring us round, by their general habits and assimilating characters of bill and *tarsi*, to *Myiothera*, where we entered the family. Those birds which constitute the groups which we denominate *Chatterers*, and which form the genus *Ampelis* of Linnæus, are usually assigned a place near this family: and I must confess that, from the general affinity which they appear to bear to it, I have felt, and still feel, considerable doubt whether this be not their natural station. A strong affinity, however, on the other hand, seems to unite them with the wide-gaped *Pipræ*, and some of those other groups, which by their bill, broad and depressed at the base, appear to come in contact with the earlier divisions of the present tribe, and the extremes of the *Fissirostres* which precede it. The general rule of placing groups in a conterminous situation, according to what appears to be the predominance of their more important

of that gentleman, *Formicivora*, *Urotomus*, and *Drymophila*, in the 1st volume of the "*Zoological Journal*," p. 301. Nov. 1824.

* "GALBULA — cum *Turdis* et *Merulis* Rostri totiusque corporis figurâ, magnitudine quoque et victûs ratione convenit."—*Raii Syn. Meth. Av.* p. 68.

characters,

characters, has inclined me to arrange the birds of which I speak, provisionally among the *Pipridæ*, at the extreme termination of the tribe before us. In my present view of the case, the characters in which they accord with that family and approximate the extreme groups of the preceding tribe, appear to predominate. More accurate knowledge on these subjects will clear away these and similar difficulties. But I cannot too often insist upon the point, that whatever alterations may take place hereafter in our ideas respecting the disposition of these subordinate groups, they cannot interfere with the general principles which it is the object of this inquiry to illustrate. Instead of impugning our general views, they will merely remove those doubts on minor points in which our present limited acquaintance with nature involves us.

Proceeding to the *Sylviadæ*, the *Warblers* of our British ornithologists, we may observe that the family, assimilated to the groups we have just quitted in the sweetness and compass of their vocal powers, is separated from them chiefly by their more delicate structure and more subulate bill. That portion of the Linnean *Motacilla*, or rather of the *Sylvia* of Dr. Latham, which M. Bechstein has separated from the genus under the title of *Accentor*, in conjunction with that which embraces the *S. luscinia*, the well-known songster of the night, appears to be the group that most nearly approaches the *Thrushes* by the comparative strength of its formation. Here also, perhaps, we may find the *Hylophilus*, Temm. of the New World, and the *Iora*, Horsf. of the East, to be united by their stronger bills. Hence, a number of intervening groups, among which *Brachypteryx*, Horsf. may be noticed, and that which includes the *S. rubecola*, the favourite *Redbreast* of our gardens, may not be passed over, conduct us by their gradually lessening bill and more slender form, to those birds in which the delicate body, the tapering legs, and the gracile and subulate bill, point out their typical supremacy in the family. To these latter

latter groups are nearly allied the *Melizophilus*, Leach., our *Dartford Warbler*, and the *Malurus**, Vieill., the representative of *Sylvia* in Australasia, in both of which the bill deviates from that of the conterminous genera in the *culmen* being somewhat arched; as also those birds which are known to us under the familiar appellation of *Wrens*, or the genera *Troglodytes*†, and *Regulus*, Cuv. To these succeed a number of groups where the lengthened *tarsi* point out their natural station on the ground, such as the *Budytes* of M. Cuvier, the true *Motacilla* of authors, and the *Enicurus* of M. Temminck: here also may be added the *Megalurus*, Horsf., and *Anthus*, Bechst., which unite, as will be observed hereafter, the present tribe with that of the *Conirostres*, by means of the *Alauda* of authors. Close to these birds we find
a group

* I speak only of the genus *Malurus* as originally instituted by M. Vieillot (*Analyse d'un Nouv. Orn. Elem.* p. 44.), and which seems to be limited to Australasia. M. Temminck has altered the characters of this genus and so extended them, as to embrace some African species, together with the Eastern Archipelagan group, *Megalurus*, Horsf.; all birds, in my opinion, decidedly dissimilar to the original group pointed out and characterized by M. Vieillot. Mr. Swainson, following the views of M. Temminck, has added a Brazilian species to the genus (*Zool. Illust.* Pl. 138); but very naturally expresses his doubts whether the bounds of the genus have not been too much enlarged, and the group rendered perfectly artificial.

† It is a common opinion among modern naturalists, that the genus *Troglodytes*, of which the type is our common *Wren*, is a true scansorial bird, and should be referred to my family of *Certhiadae*, which will hereafter be seen to come in among the *Scansores*. From the observations which I have hitherto been enabled to make on the manners of this bird, I cannot at present subscribe to this opinion. That the bird partially climbs in taking its food is evident to every observer; but so do the *Reguli* and *Pari*. The line of distinction between the present limited group of climbers, and the extensive family of true *Certhiadae*, is marked out in the former using their bill and the latter their tongue in seizing their insect food. If the *Troglodytes* be found to use its tongue for this purpose, it must of course be removed from the *Sylviadae*; but hitherto I have had no proof of such a fact. Mr. Wilson in his "*American Ornithology*" has described some birds closely assimilated in general appearance to *Troglodytes*, which, from actual observation of their habits and the structure of the tongue, he very properly

a group nearly allied to them in its terrestrial habits and general conformation, the *Saxicola*, Bechst., but which, by its increasing bill, brings us round to the earlier groups of the present family, and thence to the *Merulidæ*, with the section *Saxicoles* of which it is nearly connected*. The circular disposition by which the extremes of different families may be brought into contact with each other, explains the manner in which the genus *Saxicola*, the section of *Merles Saxicoles*, the genus *Myiothera*, and the more delicate forms of *Thamnophilus*,—all birds decidedly approaching each other, yet belonging to the different families of *Sylviadæ*, *Merulidæ*, and *Laniadæ*,—still preserve their union, and are brought together into what may be considered one conterminous assemblage.

properly places in the same genus with the *Certhia familiaris*. But in speaking of two of these birds, *Certhia Caroliniana* and *C. palustris*, he distinctly points out the generic difference between them and *Troglodytes*. “The present species, however, and the preceding, though possessing great family likeness to those above-mentioned (the common Wren of Europe and the Winter Wren of the United States), are decisively *Creepers*, if the bill, the *tongue*, nostrils and claws are to be the criteria by which we are to class them.” vol. ii. p. 61. Again, in speaking of the *Winter Wren* of America, which the same accurate observer expresses his “strong suspicion” of being “the same species as the *common domestic Wren* of Britain,” he expressly states his opinion, that this species and the *C. palustris* are generically distinct. “They, however, not only breed in different regions, but belong to different genera; the Marsh Wren being decisively a species of *Certhia*, and the Winter Wren a true *Motacilla*.” vol. i. p. 40. I wish for no further corroboration of my present views on the subject, than the above observations of that truly accurate naturalist. I have never had an opportunity of examining a specimen of *Certhia Caroliniana*; but in the plate in which it is figured in the “*American Ornithology*” (Pl. xii. fig. 5.) the hind toe appears strong and elongated, after the manner of the true scansorial *Certhiadæ*, while the hind toe of *Troglodytes* is not more developed than in the conterminous *Warblers*. We may observe these two groups to be placed in opposite stations in the general circle of affinity, and may add this instance to many others, where groups similarly circumstanced are found to meet.

* “Ces merles saxicoles, et les traquets (gen. *Saxicola*) qui y tiennent de fort près, sont placés sur la limite qui separe le grand genre *Turdus* du genre plus nombreux encore de *Sylvia*.”—*Temm. Man. d’Orn.* p. 172. ed. 2.

The

The groups to which I have lately alluded, the true *Wrens* of the *Sylviadæ*, display in their general appearance and habits so close a similarity to *Parus*, Linn., the *Titmouse* of our naturalists, that we may at once acknowledge the affinity between the latter family and that of *Pipridæ*, upon which we now enter by means of these *Pari*. And who is there that has not been attracted by the interesting manners of both these familiar visitors of our domestic haunts, and at the same time has not been struck by their resemblance? The *penduline Titmouse*, *P. pendulinus*, Linn., longer and more slender in its bill than the *Pari* in general, seems to be the connecting link between the families. That species is immediately met by the genus *Tyrannulus* of M. Vieillot, which, in the name of "*Roitelet Mesange**," conferred by M. Buffon on the American species of which it is composed, happily illustrates the affinity which I have ventured to point out. It is pleasing to trace in groups which bear a general affinity to each other in their more essential characters, an affinity also in less consequential particulars. This is the case in the present conterminous groups of *Wrens* and *Titmice* with respect to their mode of nidification. The greater portion of both make their nests in holes of trees: but those groups which most nearly approach each other, *Regulus*, *Tyrannulus*, and *Parus pendulinus*, suspend theirs from the branches, leaving the orifice at the centre, and interlacing the materials of which it is composed with corresponding ingenuity and elegance†. The affinity between these birds has been acknowledged by scientific

* The same affinity is pointed out by the following provincial name of this bird. "REGULUS cristatus Aldrov.—The GOLDEN-CROWN'D WREN.—In agro Cardiganensi Cambriæ frequens est, nomine Britannico Syrgw i. e. *Parus chrysocephalus* dicta D. Lhwyd." *Raii Syn. Meth. Av.* p. 79.

† The contiguity of this small group to those of *Carduelis*, *Ploceus* and *Xanthornus* in the succeeding tribe of *Conirostres*, seems to point out the cause of the above singular affinity.

as well as by common observers ; and yet the former have generally ranked the *Pari* in a different tribe, and some indeed have even ranked them in a different order from the *Sylviadæ*, in consequence of their more conical bill and the absence of the mandibulary notch. A rigid deference to those particulars which form the characteristics of the conterminous subdivisions would certainly exclude the *Pari* from the present tribe of *Dentirostres*. But the nature of their food, which consists chiefly of insects, and the similarity of their habits, give them a more natural connexion with the families among which I have now ventured to point out their place, than with the hard-billed and granivorous birds, where they are generally stationed. Here it may also be observed, that they form part of one of the extreme families of the tribe, and are immediately connected with a group of the preceding family of *Sylviadæ*, which passes on to the *Conirostres*, the succeeding subdivision of the order. They thus are brought into contact with the tribe to which the strength and the conical structure of their bill indicates a conformity ; while at the same time they maintain their station among the groups where their manners and general economy would naturally place them. The *Pari*, which thus introduce us into the present family, lead us on to the more typical groups of the Linnean *Pipræ*, with which they bear an acknowledged affinity in manners and general appearance*. The genus *Pardalotus*, Vieill., which is the representative of the latter group in Australasia, appears to connect these two allied groups of the Old and the New World, by exhibiting the nearly divided foot of the one and the partially curved bill of the other. Here come in the *Rupicola*, Briss., and *Phibalura*, Vieill. And here, as I have already observed when speaking of the *Thrushes*,

* “ Les *Manakins* — d'autre part leur bec court, et leurs proportions generales, les ont fait long-temps regarder comme assez semblables à nos *Mesanges*.” Cuv. *Regne Anim.* i. p. 363.

I apprehend that all those groups will be found to assemble, which, connected with *Ampelis*, Linn., are generally denominated *Berry-Eaters* and *Chatterers*; such as *Bombycilla*, Briss., the true *Ampelis* of authors, *Casmarhinchus*, Temm., and *Procnias*, Ill. To these, the genus *Querula* of M. Vieillot may I think be added. This group, the type of which is the *Muscicapa rubricollis* of Gmelin, is strongly allied by its bill to the foregoing genera, while its habits equally ally it to the family of *Muscicapidæ* which follows. The interval between the present groups and those of the *Pari*, where we entered on the family, appears to be filled up by a race of birds peculiar to New Holland, and hitherto uncharacterized, of which the *Muscicapa pectoralis*, Lath. is the type*. These, uniting many external characters, at least, both of the *Berry-Eaters* and *Flycatchers*, exhibit also in general appearance a considerable resemblance to the *Pari*, and will be found, I conjecture, to be the connecting bond between all these groups. The affinity between this last family of the tribe and the *Muscicapidæ*, which first met our attention as we entered it, has already been observed when I spoke of the separation of the broad-billed *Chatterers* from the *Thrushes*†. And thus equally, as in the former tribe, we may recognize the completion of a circular succession of affinities between all the families of the *Dentirostres*.

§ 3. CONIROSTRES.

The tribe which next meets our attention, comprising most of the "*Conirostres*" of M. Cuvier, and including at the same time the two orders of M. Temminck, which he terms "*Omnivores*" and "*Granivores*," is characterized by the strength and conical form of the beak, and in general by the integrity of its margin.

* Mr. Swainson has lately formed this group into a genus by the name of *Pachycephala*. Nov. 1824.

† See above, p. 438. See also the relationship of these birds to the *Todidæ*, p. 431.

The

The typical groups are for the most part omnivorous; the extremes chiefly granivorous. The latter are those which are comprised by Ray among his "*Hard Bil'd Birds.*" The families of the tribe, among which are included the most powerful birds of the order, and those whose general conformation is the most perfect, may be thus arranged*.

Fringillidæ.

Sturnidæ.

Corvidæ, Leach.

Buceridæ, Leach.

Loxiadæ.

In treating of the preceding tribe, I have observed that the genus *Anthus* has been separated from *Alauda* and placed among the *Sylviadæ*, in consequence of its near affinity to that family, and more particularly to *Motacilla*, in food, in habits, and structure. *Alauda*, on the other hand, with equal attention to the same characters, has been arranged with the succeeding groups which form the tribe of *Conirostres*. These two genera, however, approaching so closely in the form of their wings and of their hind toes, and in the distribution of the colours of their plumage, cannot be allowed to be far separated from each other. The difference even in the bills of the two genera is softened down by the intervention of a Javanese genus, the *Megalurus* of Dr. Horsfield, which unites the greater length of that of *Anthus* to the superior robustness of that of *Alauda*. The affinity between them is even still further preserved by the medium of a

* Or thus, with the normal and aberrant families separated :

<i>Normal group.</i>	
Structurâ magis perfectâ: vic-	{ <i>Sturnidæ.</i>
tû universali	
	{ <i>Corvidæ.</i>
<i>Aberrant group.</i>	
Structurâ minus perfectâ: vic-	{ <i>Buceridæ.</i>
tû præcipue vegetabili . .	
	{ <i>Loxiadæ.</i>
	{ <i>Fringillidæ.</i>

second group, which forms a section at present of the genus *Anthus*, and of which the *A. Richardi*, Vieill. may be considered the type, where the bill retains the form of that of *Anthus*, but the hind claw assumes the length and straightness of the claw of *Alauda*. The strong affinity that thus exists between them receives no interruption, in consequence of their forming the extremes of the respective groups to which they belong: and thus, though justly placed in different families, and even in different tribes, they maintain that natural relationship which so intimately connects them. The family of *Fringillidæ*, upon which we now enter, contains, in addition to *Alauda*, to which *Emberiza*, Linn. and its affinities seem nearly allied,—the greater part of the Linnean *Fringillæ*, together with the Linnean *Tanagræ*, which approach them in their external characters, and in their habits, as far as has hitherto been ascertained. These latter groups contain many natural genera, into which the nature of my inquiry, limited to a rapid outline of the affinities that connect the families of the class, will not permit me at present to enter, further than to observe, that they may be traced from the point of their connexion with the Linnean *Fringillæ*, back, by a gradual increase of the base of the bill in breadth and height, to the family of *Loriadæ*, which unites with them at the opposite extremity of the series of families which compose the tribe. The *Fringillidæ*, again, by means of the sharp-pointed and lengthened bill of *Carduelis*, Briss., and by the extension of the *culmen* of the upper mandible in an angular form for some extent upon the front of the head, conduct us on the other side to the genus *Icterus*, Briss., which commences the succeeding family. Here the genus *Ploceus**, Cuv. also seems to hold an inter-

* There is another decided line of relationship between the two families, namely, that which some species of the Linnean *Alauda*, particularly *A. capensis*, bear to the *Sturnus Ludo-*

intervening station between the two groups, so as to render it difficult to decide in which of them we may assign it its station.

The family of *Sturnidæ* embraces a considerable number of groups, approaching each other in their gregarious and migratory habits. They are found in every part of the globe, united in large flocks, carrying destruction among the cultivated fields, and following herds of cattle for the sake of the insects or grains which they may pick up from their bodies or in their neighbourhood. In addition to the American genus *Icterus*, and the contiguous genera *Cassicus* and *Xanthornus* of M. Brisson, together with *Pendulinus*, Vieill., and several corresponding groups, we may observe the genus *Amblyramphus*, Leach, united to the family, as also the *Buphaga*, Linn., and *Pastor* and *Lamprotornis*, which M. Temminck has separated from the *Thrushes*. The whole of the family, united by their manners and the straight and conical form of the beak, the ridge of which passes back to some extent over the forehead, may be observed by those who cast even a casual glance over the three adjoining groups, to hold an intermediate rank between the weaker conformation of the *Fringilidæ* and the more powerful structure of the *Corvidæ*.

The *Nucifraga*, Briss., our British *Nutcracker*, closely resembling the preceding groups in the form of its bill, in conjunction with *Barita*, Cuv., introduces us into the family of *Corvidæ*. From that genus we may trace a line of affinities, through some intervening forms, to the *Jays* and *Rollers*, *Garrulus*, Briss., and *Coracias*, Linn., until we arrive at the *Corvus* of Linnæus, which again branches out into several groups closely allied to each other, but differing considerably in the structure of the bill.

Ludovicianus, or *Crescent Stare*, of Dr. Latham. This latter bird is well known as the *Alauda magna* of Linnæus, and of the American ornithologists.—*Wils. Am. Orn.* Pl. XIX. fig. 2. But its still stronger affinity to the *Sturni* and *Icteri*, necessarily places it among them. The former relationship appears to me one of analogy, not of affinity; while the direct passage between the families is found in *Ploceus*.

Hence

Hence we proceed by means of *Glaucopis*, Forst., to some genera, among which we may particularize *Ptilonorhynchus*, Kuhl., *Crypsirina*, Vieill., *Eulabes*, Cuv., and *Fregilus*, Cuv., which, in the metallic lustre of their plumage, and the velvet-like process that in some species ornaments the face, indicate our approach to the *Birds of Paradise*. The last-mentioned genus *Fregilus*, in particular, by its curved and slender bill, brings us immediately into this group, the *Paradisea*, Linn., which, in conjunction with the *Epimachus* of M. Cuvier, terminates the family of *Corvidæ*. Here we shall probably find the passage from the present to the succeeding family. The *Epimachus**, more united in its front toes than the *Corvidæ* in general, holds a middle station in respect to that character between the two groups; while in the length

* I speak with considerable hesitation as to the situation of *Epimachus*; which bears too strong a resemblance to the *Promerops* of M. Brisson, a group feeding on vegetable juices with an extensile tongue (see Cuv. *Regne Anim.* i. 407.), to permit us to separate it without some expression of doubt. On the other hand, it bears evident marks of affinity to *Paradisea*, near which genus I have placed it for the present. Its manner of feeding, and the nature of its food, when accurately known, will alone determine this point. I have some suspicion also whether some groups of *Paradisea* may not naturally have a different locality from that of the present family. The accounts which have reached us of the economy of those birds, have hitherto been vague and unsatisfactory, and bear evidently the marks of being fabulous. But popular fables have usually some foundation in truth. And the pretended apodous construction of the *Paradisea*, together with the poetical fancies of their being always found on the wing, and feeding on the dews of heaven, may be resolvable into the simple fact of their using their wings more than their legs when extracting the nectar of flowers. The strength, however, of their bills and legs in general is much against this supposition. There is, or lately has been, a specimen of the *P. apoda*, Linn., alive in this country, an account of the economy of which would be highly interesting and important. Any partial changes, however, among the subordinate groups which are brought together in the present attempt at a natural arrangement, cannot affect the general views, which alone I regard as of consequence. I cannot too often insist upon the point, that it is the great outline of affinity throughout the whole class of birds, which I endeavour to trace out in the sketch before us, and not the immediate relationship between the minor departments.

and

and curvature of its bill, it approaches, in conjunction with many of the *Paradisææ*, to some of the extreme species of the *Buceridææ*, among which the *Buceros nasutus* of Dr. Latham may be instanced.

We thus arrive at the singular family of *Buceridææ*, which seems to draw near to the preceding groups in its food and habits*, as far at least as we can conclude from the very imperfect accounts which are transmitted of them. From the strength also of the formation of these birds, and the powers with which they are endowed, they seem to assert a title to a place in the vicinity of the group which is typical in the tribe. In one particular, however, we may detect a deviation from the more perfect structure of that type. The fore toes of all are strongly united at the base, the external being joined to the middle as far as to the second articulation; an impediment which must considerably interfere with the free action of the member. This deficiency is, on the other hand, retrieved by the superior robustness and muscular conformation of the whole limb. An analogous defect, and an analogous mode of compensating for it, is observable in the *Ostrich*, a bird also, it is to be observed, closely allied to the typical group of its own family; and in both instances we may pronounce the deviation from the more regular or perfect conformation to be a defect rather to the eye of the observer, an infringement upon what he would conceive to form the *beau ideal* of the typical character, than a defect in reality. We may here delay a moment to observe upon the causes that assign so totally remote a station from the present to the *Todidææ*, *Meropidææ*, and *Halcyonidææ*, whose gressorial feet, as they are technically called, are of precisely the same structure as those of *Buceros*. In them

* Grands oiseaux d'Afrique et des Indes, — leur port et leurs habitudes les rapprochent des corbeaux. — Ils prennent toute sorte de nourriture, chassent aux souris, aux petits oiseaux, aux reptiles, et ne dédaignent pas même les cadavres. — *Cuvier, Regne Anim.* i. p. 418.

the deficiency, accompanied by a corresponding weakness of the whole member, is real, and of sufficient consequence to deprive the bird of the means of using its legs and feet to advantage. The force and powers of these parts are in fact transferred to the wings, which are thus endowed with a more than usual share of strength, in order to afford the bird a more than usual assistance in the aërial mode of seeking its food which it is assigned by Nature. In the *Buceros*, on the other hand, the gressorial feet are accompanied by a superior robustness, which counterbalances their inferiority in form. And hence the family may consistently maintain its station in the vicinity of the more perfectly formed and typical groups of the *Insessores*, which are now before us. The tendency, already observed, which opposite points of the circle in which a series of affinities is united have to approach each other, accounts for the resemblance here pointed out between these otherwise discordant groups, and serves to explain the reason why the analogous relation between them has been mistaken for a relation of affinity by systematic writers, so far as to induce them to arrange all the gressorial birds in one connected group. Besides the genus *Buceros*, Linn., the protuberance on the bill of which varies in almost every possible shape in which fancy can embody it, the present family includes the *Momotus* of M. Brisson, which accords with the entire of that genus in its gressorial feet, and with several species of it, as the genus now stands, in its curved but somewhat shorter and more attenuated bill.

The family of *Loxiadæ*, the extreme of the tribe of *Conirostres*, exhibits a conformity to the groups we have just quitted, in the strength and grossness of their bill. Inferior to them chiefly in size, some species of the family may be observed to equal even the *Hornbills*, allowance being made for their relative proportions, in the extreme enlargement of this member. The curved and serrated bill of the latter family, perceptibly shortening

ing itself, as we have perceived in *Momotus*, is still carried on to a corresponding group in the present, the *Phytotoma*, Gmel., where these characters are preserved, though the curve is slighter and the serration less strong. United to that genus by some intermediate but uncharacterized species, the *Coccothraustes*, Briss., conducts us on to several groups, among which *Pitylus*, Cuv., *Strobilophaga*, Vieill., the true *Loxia* of authors, and *Psittirostra*, Temm., may be distinguished; from whence we pass to the shorter-billed groups, among which *Colius*, Linn., and *Cissopis*, Vieill., may be particularized. These are but few of the natural genera which abound in this extensive family. Many intervening species, possessing strong generic distinctions, may be introduced among these groups, which at length terminate in some of the shorter and stronger-billed species of the Linnean *Tanagers*. These, it will be remembered, commenced the present tribe by their union with the *Fringillidæ*: and thus here also the circular succession of affinities extends uninterrupted through the whole subdivision.

§ 4. SCANSORES.

The deviation which has been observed in the *Buceridæ* from the more perfect formation of the foot, prepares us for the still more considerable deviation that takes place in the same particular among the *Scansorial Birds*; and we consequently expect to find the passage from the *Conirostres* to the *Scansores* in that family, which thus opens the way between them. In this expectation we are not disappointed. Besides the approach which we have just noticed in the *Buceridæ* to the imperfect form of the scansorial foot, we may perceive that the large and disproportionate bill of that family is carried on* to the *Ramphastidæ*, the first

* “ Les Calaos, (*Buceros*, L.) — Grands oiseaux — que leur enorme bec dentelé surmonté de proéminences quelquefois aussi grandes que lui, ou au moins fortement renflé

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first family of the *Scansores* which meets our attention. There is seldom, perhaps, a surer guide to relations of affinity and analogy than common observation; and a trivial or provincial name often anticipates the more correct and scientific views of the naturalist. In seeking for the immediate point of junction between the two tribes now before us, we are in this manner directed at once to the object of our search; a scansorial genus, belonging to the family of *Ramphastidæ*, the *Scythrops* of Dr. Latham, being designated, as may be seen in the Collection belonging to this Society, by the denomination of "*Psittaceous Hornbill*." Whoever will compare this bird with some of the extreme species of the *Buceros*, those I mean without the protuberance on the bill, will readily acknowledge the appropriateness of the title, and recognise the affinity which leads us from the preceding to the present tribe. The scansorial families may thus be grouped*:

renflé en dessus, rend si remarquables et lie avec les Toucans."—Cuvier, *Regne Anim.* i. p. 418. The general accounts which we have of the manners of these birds tend equally to assimilate them. Mr. Swainson informs me, from observations made during his researches in South America, that he has every reason to suppose that the *Ramphastidæ* are accustomed to feed during the season of incubation upon the eggs and young of other birds. I have here to add, that a specimen of the *R. erythrorhynchos*, Gmel., now alive in this country, shows an evident partiality to animal food, and a disposition to prey upon weaker birds. I am informed that, shortly after its arrival in this country, it seized upon a small-bird that accidentally came within its reach, and devoured it in a truly raptorial manner. It has since been occasionally fed with small-birds, and with eggs, which seem to be its favourite food. These manners accord with those of *Buceros*, as detailed in M. Cuvier's valuable observations. See note *, p. 449. Nov. 1824.

* Or in this manner, if we distinguish the typical families:

<i>Normal group.</i>	
Digitis zygodactylis, haud retractilibus	{ <i>Psittacidæ</i> .
	{ <i>Picidæ</i> .
<i>Aberrant group.</i>	
Digitis aut tribus anticis et uno postico scansorio, aut zygodactylis, at retractilibus . . .	{ <i>Certhiadæ</i> .
	{ <i>Cuculidæ</i> .
	{ <i>Ramphastidæ</i> .

Ramphastidæ

Ramphastidæ.

Psittacidæ, Leach.

Picidæ, Leach.

Certhiadæ.

Cuculidæ, Leach.

Commencing our examination of the present tribe with the family of *Ramphastidæ*, we may observe that it is composed of the genera *Ramphastos*, Linn., and *Pteroglossus*, Ill., which fill up the same station in the New World that *Buceros*, the group which we have just quitted, maintains in the Old. To these genera we have already seen that *Scythrops* may be added, which appears equally assimilated to both groups, and thus to supply their place in that new division of the globe, the continent of Australasia. This genus, it may be observed, unites the present family with the larger and more prominent billed *Cuculidæ*, which meet it at the other extremity of the tribe: and here in this direction, the succession of affinities appears established. The immediate connexion, however, of *Ramphastos* with the succeeding group of *Psittacidæ* is not so evident. These families are placed next to each other by all systematic writers; and I decidedly concur in the general views which bring them into neighbouring groups. But at present I am acquainted with no forms which intimately connect them, and soften down the important difference observable in the bills and tongues of these birds. This is one of the greatest chasms which interfere with the continuity of our chain of affinities. I might indeed hazard some suggestions* as to the mode in which this difficulty may

* I might particularly mention the *Trogon*, Linn., as a bird, whose bill, serrated, but at the same time short and hooked, seems to give it a similitude to each of these groups. We know but little of this genus, although it abounds both in the Old and New World, and that little is altogether insufficient to afford us any information as to its actual affinities.

be solved ; but I wish chiefly to illustrate the general principles of this inquiry by such facts as are acknowledged, and such inferences as are indisputable, without treading on the unstable ground of conjecture. The candid exposition of the present and similar *desiderata* will only tend, I hope, to draw the attention of those who are interested in such subjects more closely to these points, with the view of supplying our deficiencies by more accurate research.

It is not, however, to the *Ramphastidæ* that we have to attribute this present apparent interruption in our series, so much as to the *Psittacidæ*, upon which we now enter. This family affords more difficulties to the inquirer into affinities than any other known group in the whole class. In manners and general structure, as well as in the mode of using their feet and bill, the *Parrots* hold nearly an insulated situation among birds ; and they may perhaps be pronounced to be the only group among them which is completely *sui generis*. In the formation of my opinion, that their station in nature accords with the place assigned them in the foregoing series, and that they come next to the *Picidæ* in affinity, I at first felt some doubt, in consequence of the difference in their bills and tongues, here equally apparent as in the case immediately preceding. But I was decided in my opinion by observing, that while there was no other group with which they accord more closely in such characters, they possess an affinity to no birds but the *Picidæ*, in the structure of the foot and the use to which they apply it. It is to be remembered, that the leading characteristic of the tribe before us is the faculty of climbing ; and the greater portion of the families contained in it possess what are technically called *zygodactyle* feet, or feet in which the toes are disposed in pairs, and which are generally considered as conducive to that faculty. But the *Picidæ* and the *Psittacidæ* are the only families, thus distinguished, whose toes
are

are strictly and constantly disposed in pairs : and they are consequently the only groups which constantly benefit by that construction in climbing. The external hind toe of the other *Scansores* is retractile : and these birds are never observed to climb, at least to that extent which is common to the two families in question. We may thus venture, I think, to separate the *Parrots* and *Woodpeckers* from the other families, and to associate them together, in consequence of their affinity in these essential characteristics of the tribe. In this point of view they will compose its normal groups, as climbers *par excellence*, differing, however, as to the mode in which they climb ; the *Parrots* using the foot chiefly in grasping the object which assists them in their ascent, and in conjunction with the bill ; while the *Picidæ* rely upon the strength and straightness of the hind toes in supporting them in a perpendicular position on the sides of trees ; in which posture they are also assisted by the strong shafts of the tail-feathers. While I was influenced by these general points of coincidence, in placing the *Psittacidæ* and *Picidæ* together*, I recognised a group which appeared to intervene between them, and to diminish the apparent distance that exists even in the form of their bill. That important group, which comprises the Linnean *Barbets*, evidently exhibited the expected gradation in the structure of that member ; the bill of *Pogonias*, Ill. approaching most nearly that of the *Parrots*, by its short, strong, and hooked conformation†,

* There are some minuter and less essential points also in which this approximation is evident. Some of the *Psittacidæ*, among which I shall particularize the *Psittacus Alexandri*, Linn., and its congeners, partially employ the tail in supporting themselves as they climb, in a corresponding manner with the *Woodpeckers*. I make this remark from my own observation. The tongue also peculiar to the family may be observed to become slenderer, and, as is said, more extensible, in that group of which *P. aterrimus*, Gmel. is the representative ; thus evincing an approximation, slight indeed, but still an approximation, to the bill of the *Woodpeckers*.

† It also comes nearer to them by its frugivorous habits. “ Ils (Sc. les *Barbicans*) mangent plus de fruits que les autres espèces.”—Cuv. *Regne Anim.* i. p. 428.

while

while the straighter and more lengthened bill of the true *Bucco* united itself to that of *Picus*. Many other particulars in form, and also an extraordinary conformity in colouring, still further pointed out the affinity; and I was at length confirmed in my conjectures respecting the situation of these birds, by arriving at the knowledge of their habits being actually those of the true *Woodpeckers**, and of their chief affinity being to that group. The regular gradation by which these two families, united in their general characters—and those the characters, it must be remembered, most prominent and typical in their own tribe—are also united in their minuter points of formation, appears to me now eminently conspicuous.

We are thus introduced to the family of *Picidæ*, a very important and well-defined group both in manners and general conformation. It is composed, as we have seen, of the genus *Pogonias*, Ill., in some species of which the serrated bill is gradually lost, or rather changes into the entire bill of some of the shorter-billed species of the true *Bucco*, Auct., which succeed them. The bills of these again lengthen by degrees, and nearly assume the form of those of the Linnean *Picus*, which composes the

* “The only birds were a little noisy *Barbet* (*Pogonias*, Ill.—*Bucco niger*, Gmel.), which the Hottentots called *Hout Kapper* (*Woodcutter*), from the noise it makes with the beak against the branches of trees, in search of insects.”—*Burchell, Travels in Africa*, vol. i. p. 318. My attention was first called to the above peculiarity in the manners of the *Barbets* by Mr. Swainson, to whose friendship I am indebted for much valuable information in my inquiries into affinities: and on applying to my friend Mr. Burchell for further information, I received still more corroborating proofs of the intervention of these birds between the *Parrots* and *Woodpeckers*. That gentleman also entered into a detailed account of these affinities, before a meeting of the Zoological Club of the Linnean Society, extracted from his personal observations during his Travels. But I refrain from entering further into the subject than the foregoing extract from his published narrative, lest I should in any way anticipate the very interesting observations which the scientific world are anxiously looking for, on the Natural History of Southern Africa. Nov. 1824.

greater

greater portion of the present family. A group of these, represented by the *Picus minutus*, Linn., in which the shafts of the tail-feathers are soft and flexible, unlike those of the genuine *Woodpeckers*, leads round again to the *Barbets*, where the family commences. To these also the well-known genus *Yunx*, Linn., appears to be associated. The strong affinity between this family and the succeeding group of *Certhiæ*, in their general habits of climbing, and of feeding by their extensile tongue, needs no illustration. In less important points they equally pass into each other. The difference in the form of the typical bill of *Picus*, and that of the true *Certhiæ*,—the one straight and powerful, the other curved and slender,—is softened down by the intervention of the genus *Dendrocolaptes*, Herm.; which, as it stands at present, includes some groups* where the bill is as strong and as straight as in *Picus*; others† where the bill, still retaining its strength, becomes gradually curved; and others‡, where the same member, still further deviating from the type of the genus to which it belongs, assumes the full curve and slenderness of the bill of the typical *Certhiæ*. The former group, or the Linnean *Pici*, it may be again observed, includes some species where the bill loses the straight and angulated form, and becomes curved and compressed. These birds, of which the *Picus auratus* of Linnaeus is the representative§, exhibit in this particular an evident approximation to the true *Creepers*; while these latter birds, on the other hand, evince an equal contiguity to the former, in some of the aberrant groups of the family, which retain the stiff shafts of the tail-feathers, so conspicuous in the true *Pici*. The gradual manner in which the two groups pass into each

* *Dendrocolaptes Picus*. Pl. Enl. 605.

† *D. scandens*. Pl. Enl. 621.

‡ *D. procurvus*. Temm. Pl. Col. 28.

§ This group forms the genus *Colaptes* of Mr. Swainson.

other

other would leave us in some doubt as to where the line of demarcation may be drawn between them, did not the conformation of the foot of the *Certhiadae* evidently evince a deviation from the perfect structure of the more typical *Scansores*, and thus distinguishing them as an aberrant group of the tribe, make it necessary that they should be placed in a separate family.

The different structure of the foot from that of *Picus* thus brings us among the *Certhiadae*. Here that member is not strictly scansorial. But a similar assistance to what is conferred on the *Picidae* in climbing, by the two toes being placed behind, is afforded the *Certhiadae* by the single hind toe being considerably longer and more robust than is usual among the *Perchers*. The affinity that brings these birds together in a natural group is thus preserved, not by an identical, but by a similar and equally effective mode of conformation. I feel some diffidence, I must confess, in infringing upon the usual and more regular rules of systematic arrangement, by placing this family among the birds with true scansorial feet: but I am influenced by a consideration paramount to that of uniformity of system; by observing, in fact, that the whole group of climbing birds before us is united by strong natural affinities. And when I perceive a series of natural objects thus united, I draw the conclusion that it is the group which affords the character, and not the character which constitutes the group.—“Scias,” says the great master of natural science, “characterem non constituere genus, sed genus characterem:—characterem non fluere e genere, sed genus e caractere:—characterem non esse ut genus fiat, sed ut genus noscatur*.”—In a group strongly and naturally united as that before us, the evanescence in any of its subordinate subdivisions of any particular character common to the rest, does not prove that the subdivision in which such a character disappears is incon-

* *Linn. Phil. Bot.* p. 119.

gruous with the group in general, but merely that it is placed at the extremity of it, and forms the passage to another. This is the case with the *Certhiadae*, which become an aberrant group in the tribe, inasmuch as they deviate from the more perfect formation of the typical *Scansores*, and at the same time, as will be presently observed, lead the way immediately to the succeeding tribe of *Tenuirostres* by having in common with them the habit of feeding by the tongue. In addition to *Dendrocolaptes*, already mentioned, and the true *Certhia* of the present day, the family before us consists of a variety of genera strongly united by their corresponding habits. Among these, *Climacteris*, Temm., and *Orthonyx*, Temm., preserve the strong shafts of the tail-feathers which are carried on to them from the true *Pici*. This construction gradually disappears in the remaining groups of the family ; but the strong hind toe and the tongue more or less extensile, and serving to spear their prey, is still conspicuous. Among such groups we may particularize the *Tichodroma*, Ill., and *Upupa**, Linn., together with the Linnean *Sitta* and the conterminous form of *Xenops*, Ill. Here also may be associated the *Opetiorhynchus* and *Anabates* of M. Temminck, as also the *Oxyrhynchus* of the same author. This genus may be observed to be connected with those groups of the present family which are united with the genus *Yunx* of the preceding ; it is a perfect *Wryneck*, as justly asserted by M. Temminck†, with a *Creeper's* foot. I wish not at present, however, to enter into the affinities of these groups. We know but little of them as yet : and every day is bringing in fresh subjects, and fresh information on a department of the class which has hitherto, I know not why, attracted but little attention.

Neither do I wish to dwell with any particularity on the suc-

* “ Ce que le *Grimpereau* et le *Tichodrome* font sur les arbres, et le long des murailles, la *Huppe* le fait a terre.”—*Temm. Man. d'Orn.* p. 414.

† *Man. d'Orn.* p. lxxx.

ceeding family of *Cuculidæ*, the various and extensive genera of which are as yet but little understood, as far as regards their natural affinities. The Linnean genus *Cuculus*, indeed, as at present constituted, forms an extremely artificial group. There is much to be done with respect to these birds, and they would form an interesting subject for the researches of an ornithologist who might have leisure and opportunity to describe their living manners and economy. I shall only now observe with respect to external character, that some genera of the family are associated with the true *Cuculus* by their curved and slender bill; others, like *Indicator*, Vieill., have a shorter and stronger bill; while *Saurothera*, Vieill., by its serrated bill evinces an approaching conformity to the *Ramphastidæ*; and a considerable number, such as *Centropus*, Ill., *Phænicopterus*, Vieill., and *Crotophaga*, Linn., indicate the same affinity by the gradual increase of the bill in length and size. The last-mentioned genus, it may also be added, bears a relation, through the medium of *Scythrops*, to the *Hornbills*; some species of that family, and one more particularly lately discovered* in the interior of Africa, possessing,

* The bird I allude to is in the possession of Mr. Leadbeater, of Brewer-street, who has kindly allowed me to give the following description of the species:

BUCEROS, Linn.

LEADBEATERI. *B. niger, remigibus primoribus albis; regione ophthalmicâ guttureque nudis coccineis, cæruleo-variegatis; rostri dorso elevato, cultrato, compresso.*

Rostrum nigrum, dorso carinato, *Crotophagæ* rostro persimile. *Capitis vertex, remiges secundariæ* quinque internæ, *rectricesque* intensè nigræ. *Dorsum, collum, pectus, abdomen, remigesque secundariæ, quinque internis exceptis, fusco-nigræ: remiges primariæ albæ, maculis parvis nigris confertis ad medium pogonii externi conspersæ.* Long. corporis, 3 ped. $7\frac{1}{2}$ unc.: *rostri*, ad frontem, $7\frac{3}{4}$ unc., ad rectum, 8; altitudo, $2\frac{3}{4}$. Long. *tarsi*, $6\frac{1}{2}$: *digiti medii* ungue incluso, $3\frac{1}{2}$: *hallucis* ungue incluso, $2\frac{1}{2}$: *unguis medii*, $\frac{3}{4}$.

Habitat in Africâ interiori Septentrionali.

In Mus. Dom. Leadbeateri.

OBS. Hæc species, *B. Abyssinico* in cæteris valde affinis, rostri structurâ omnino differt.
though

though with gigantic dimensions, the exact bill of the *Ani*. The series of affinity, in which the *Scansores* are united, thus returns into itself.

§ 5. TENUIROSTRES.

The genus *Certhia*, as originally instituted by Linnæus, contained, besides the true *Certhia* and its congeners, which form the extreme family of the preceding tribe, all those birds whose slender and gradually curved bills, and delicate formation of body, added to their practice of employing their tongues in taking their food, indicated a strong affinity to each other, and which have since been particularized by authors under the various names of *Nectarinia*, *Cinnyris*, *Drepanis*, &c. To the group thus known and described by the Swedish naturalist, later ornithologists, who have strictly followed his steps, have added another, discovered since his time in Australasia, similar in habits and manners, and now distinguished by the generic title of *Meliphaga*. The whole of the birds, however, thus united by close affinities, and as such generally brought together by systematic writers into one conterminous series, are decidedly divisible into two distinct groups, naturally arranging themselves under different subdivisions of the order. The family of *Certhiade*, as we have seen above, live upon animal food ; while the remaining genera of the Linnean *Certhia* subsist chiefly upon vegetable juices. The tongues of each, though similar in being more or less extensible, and in being the medium through which they are supplied with food, are equally distinct as the nature of the food itself. Those of the former are sharp, and of a spear-like form, as if to transfix the insects which are their prey ; while those of the latter are divided into tubular filaments, which appear exclusively adapted to the purposes of suction. In other particulars they exhibit an equal difference. The *Certhiade* climb, and their feet are of a conformable structure : but the feet

of the *Suctorial Birds* are not only in general unsuited to that purpose, but they become gradually weaker and of less use, as they come nearer the type of the tribe, where they are so short and slightly formed, as to be serviceable only in perching, when the bird is at rest. It is one of the greatest beauties of the natural system which it is my object in these inquiries to illustrate, that it reconciles decided differences with decided affinities, and renders the otherwise discordant views of systematic writers compatible with each other. It is thus that the two groups of the Linnean *Certhia* are disposed in the separate departments to which the distinct nature of their food and habits more immediately unites them; while at the same time, by their forming the extremes of their respective tribes, and touching each other at the corresponding points of the circles in which they are arranged, their obvious affinities are preserved inviolate.

We thus find ourselves among the *Tenuirostres*, or *Suctorial Birds*, the most interesting group perhaps of the animal world. Deriving their subsistence for the most part from the nectar of flowers, we never fail to associate them in idea with that more beautiful and perfect part of the vegetable creation, with which, in their delicacy and fragility of form, their variety and brilliancy of hues, not less than by their extracting their nourishment from vegetable juices, they appear to have so many relations. As the tribe is confined exclusively to the torrid zone and the southern hemisphere, the naturalists of our northern latitudes have little opportunity of observing their manners or of inspecting their internal construction. Much confusion has consequently arisen in assigning them their respective stations, more particularly among the *Honeysuckers* of New Holland, which have been indiscriminately scattered among every group of the order. In the absence of that certain and perfect information which alone can authorise us to decide upon the station of any
bird

bird in nature, I cannot at present undertake to fill up the details of this tribe, with much pretension to accuracy. The following sketch however of the suctorial families will, I imagine, be found to afford some approach, in its general outline, to the natural divisions into which the tribe branches out, and to the order in which they succeed each other*.

Nectariniadæ ?

Cinnyridæ.

Trochilidæ.

Promeropidæ ?

Meliphagidæ ?

M. Illiger was the first who separated the true *Certhia* of the present day from the groups of the Linnean *Certhia*, which feed upon vegetable juices, and which he therefore distinguished by the generic title of *Nectarinia*. This latter genus, comprising two distinct and strongly marked groups, has again been separated by M. Cuvier into two divisions ; to the first of which, consisting of birds whose bills are shorter and stronger than those of the second, and whose feet are also in general more robust, he has retained the name of *Nectarinia*, while he has distinguished the latter division, where the bills are longer and more attenuated, and the legs and feet are proportionally more delicate, by the appellation of *Cinnyris*. The two first families in the above arrangement

* Arranged according to their typical characters, they thus succeed each other :

<i>Normal group.</i>	
Rostris pedibusque gracilibus	{ <i>Cinnyridæ</i> .
	{ <i>Trochilidæ</i> .
<i>Aberrant group.</i>	
Rostris pedibusque fortioribus	{ <i>Promeropidæ</i> ?
	{ <i>Meliphagidæ</i> ?
	{ <i>Nectariniadæ</i> ?

accord

accord with these views of the distinguished French naturalist. Besides the difference in their structure, the two groups may be separated by their geographical limits. The *Nectariniadæ*, as far as I can trace out their extent, are confined to the New World; while the *Cinnyridæ* are circumscribed within the bounds of the ancient continent and its adjoining islands. In looking to the succession of affinities in the tribe, we may remark that the *Nectariniadæ* appear to hold, by the comparative strength of their feet and bill, an intermediate rank between the *Creepers* of the last tribe and the typical groups of the present. In the use they make of their feet, this is particularly observable. The *Certhiadæ*, as we have seen, employ their feet in climbing: the *Nectariniadæ* do not climb, but hop from flower to flower*, exploring the nectary of each; while the *Cinnyridæ* and *Trochilidæ* make no use whatever of the foot as they extract their food, but during this process are poised entirely on the wing. The two last-mentioned families again approach each other in the slenderness of their bill, the vividness and changeable lustre of their plumage, and the habit of hovering on the wing while they feed. They are chiefly separated by the comparatively stronger foot and bill of the *Cinnyridæ*. A line of demarcation also points out the geographical distribution of these two families, the *Trochilidæ* being exclusively confined to America, and the *Cinnyridæ*, as I have already stated, to the Old World. These two typical families are the only groups in the tribe of whose situation I can speak with any

* The following are the observations of a scientific eye-witness of the manners of a species of the *Nectariniadæ*, the *Nectarinia cyanocephala*. "Its habits are no less perfectly the same as the rest of the *Nectariniæ*. It frequents the same trees as the Humming-birds, hopping from flower to flower, and extracting the nectar from each; but this is not done on the wing, because its formation is obviously different from the Humming-birds, which, on the contrary, poise themselves in the air during feeding." *Swainson, Zoological Illustrations*, Pl. 117.

confidence*. The aberrant families are so numerous in their forms, and hitherto have been so unsatisfactorily characterized,

* During the time that has elapsed since the reading of the above observations on the *Tenuirostres*, I was in hopes of having it in my power to trace their affinities more perfectly through their various subordinate groups before my remarks went to press. My friend Mr. Swainson, having lately paid considerable attention to this tribe, kindly promised me the result of his labours to enable me to apply them to the general object of this inquiry. But various delays and circumstances, over which neither he nor I had any controul, have prevented our mutual wishes taking effect; and the above imperfect sketch must go forth as it originally stood. I have introduced, however, the genus *Promerops* as the connecting group between the *Tenuirostres* and *Fissirostres*, according to a suggestion which that gentleman some time since made to me in a conversation respecting these groups. I had originally conjectured that the genus *Dicaeum* of M. Cuvier and of Dr. Horsfield (*Linnean Transactions*, vol. xiii. p. 169.) would constitute this aberrant subdivision. The "Zoology of Mexico," now about to appear, may be referred to as explaining the immediate affinities of these truly interesting families. Nov. 1824.

Since the above observations were sent to press, I perceive that Mr. Swainson has published his views on the general disposition of the *Tenuirostres* in the 1st volume of the *Zoological Journal*, p. 479. He introduces the Linnean genus *Paradisea* as one of the five groups of the tribe, and as supplying the interval between the families of *Meliphagidae* and *Promeropidae*. I have already stated my suspicions (p. 448, note *) that the *Birds of Paradise*, or at least some groups of them, may eventually be found to be more nearly allied to the *Mellivorous Birds* with extensile and tubular tongues, than to the family of *Corvidae*, with which ornithologists in general conceive them to be connected. And my opinions on this point have been considerably strengthened by finding that Mr. Swainson has adopted a mode of distribution conformable to such a supposition. But the nature of an inquiry like the present, limited to a simple exposition of facts, as far as they can be ascertained, and to such inferences only as are deducible from these facts, originally forbade me to offer more than a mere suggestion on this point, and still prevents me from expressing myself with any confidence respecting it. The question, in short, is one exclusively of fact. The Linnean *Paradisea* confessedly exhibit in external appearance a strong relationship to both the *Conirostral* and *Tenuirostral* families. But to which of the two groups they are related by affinity, and to which by analogy, depends entirely on the nature of their food and the structure of their tongue. I must confess that I feel considerable interest in this question, and sanguine hopes that Mr. Swainson's distribution may be found to accord with that of Nature. The junction of the *Paradisea* to the *Tenuirostres* would add all that is wanting to complete the interest of that already singularly attractive group. Jan. 1825.

that

that it is impossible to speak of them with that certainty which may attend our observations on groups that are better defined. The genus *Promerops*, Briss., appears to be that form of the present tribe which approaches nearest to the adjoining tribe of *Fissirostres*. Retaining the slender bill of the *Tenuirostres*, it exhibits somewhat of the broad base of the bill of the *Fissirostres*, and at the same time their gressorial feet. By means of *Merops*, the curved bill of which approaches the structure of its own, it appears to be immediately connected with that group. Of the limits of this family, which may receive its appellation from M. Brisson's above-mentioned genus, I can say nothing at present; nor do I wish to enter into more than a general reference to the succeeding family of *Meliphagidæ*. That extraordinary group, the existence of the much more considerable portion of which was unknown to the Swedish naturalist, and for which there was consequently no place in his system, occupies a prominent and important situation in the ornithological department of Nature. Chiefly confined to Australasia, where they abound in every variety of form, and in an apparently inexhaustible multitude of species, they find a sufficient and never-failing support in the luxuriant vegetation of that country. There the fields are never without blossom, and some different species of plants, particularly the species of *Eucalyptus*, afford a constant succession of that food which is suited to the tubular and brush-like structure of the tongue in these birds. Their numbers and variety seem in consequence to be almost unlimited. Like the *Marsupial Animals* of the same country, a group to all appearance equally anomalous, which contains within its own circle representatives of all the other groups of the *Mammalia*, this division of birds comprises every form which is observable among the families of the *Insessores*. From the powerfully constructed and strong-billed *Corvidæ* and *Orioli*, down to the slender *Merops* and the delicately shaped *Cinnyris*, every *Insectorial* group has its

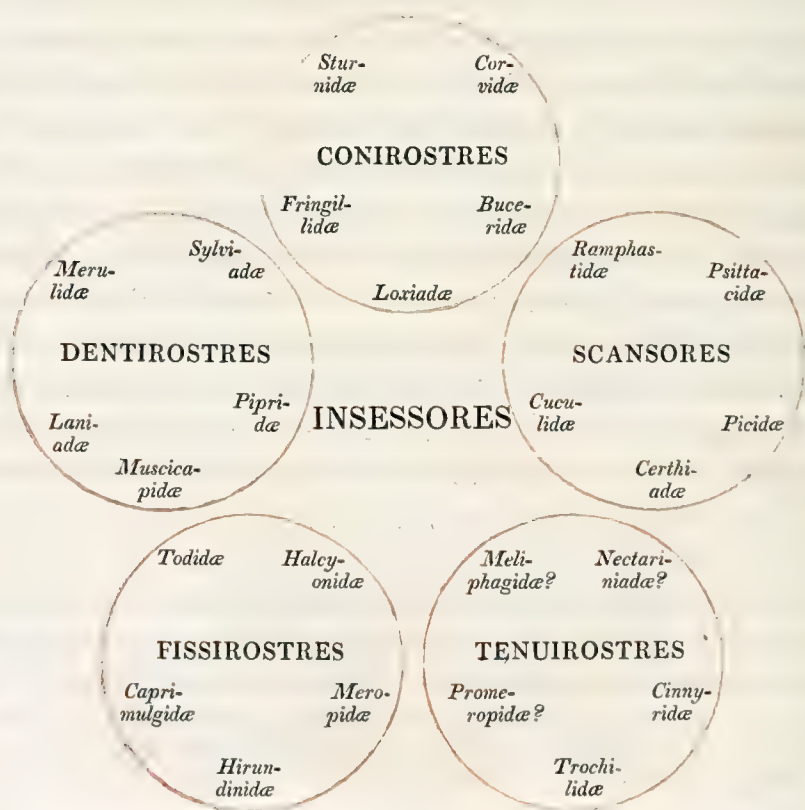
its analogous type in this family. Their approach to the *Scansorial* tribe is strongly conspicuous. The hind toe of the greater portion of the group is long, powerful, and apparently formed for climbing*. In this point of view they seem in Australasia to supply the place of the genuine *Pici*; no species of *Woodpecker*, as far as I have been able to ascertain, having hitherto been found in that country. This strong affinity to the *Scansores* is preserved by their forming one of the extremes of the present circle, which comes in contact with that tribe. I have indeed some doubts whether, in consequence of this affinity, they may not be even still more intimately united to that group, and form the immediate point of junction of the present tribe with the *Certhiadae*. I have consequently entered them and their conterminous families into the above tabular series with a mark of uncertainty. Time, with more accurate examination of their manners and internal economy, will clear away, it is to be hoped, these and similar points of doubt respecting groups so interesting. The following facts, however, are I think sufficiently decided, namely, that the three last-mentioned groups, the *Promeropidae*, *Meliphagidae*, and *Nectariniadae* constitute distinct and prominent divisions in the tribe, of which by that generally stronger and more perfect† conformation, which distinguishes them from the more typical families, they form the aberrant groups; that they are united among themselves by general affinities; and that they connect the tribe on each side with the conterminous tribes that approach it, that is,

* Mr. Lewin, in the generic description of *Meliphaga* in his "Birds of New Holland," has strongly pointed out this character.

† In a group, which is itself aberrant in a division of a higher denomination, the typical forms will necessarily be more imperfect than those which deviate from the type, whenever the latter are more nearly united to the more perfect groups of the higher division: in this case the minor aberrant groups will partake in some degree of their perfection; while the former, situated most remotely from them, will of consequence partake of it to a less extent.

with the *Scansores* at the one extreme, and with the *Fissirostres*, where we first entered on the order, at the other.

It will thus afford some recompense to the labours of those who may have accompanied me so far in my progress through the different tribes of the *Insessores*, to find the extremes of that order thus connected together, and the whole of the affinities by which its various groups are linked to each other thus existing in beautiful harmony. For the more perfect intelligence of those who may wish to see at one view how these groups are united, I shall submit the following table to their inspection, which will at the same time serve to explain some curious particulars that attend the distribution of these *Perchers*.



Among the advantages derived from an inspection of the foregoing diagram is that of our being able to discern at one view the gradual deviation which takes place in the various groups from the more typical form and character of the order. If we fix our attention steadily on the central and typical group of *Conirostres*, we may trace out at a glance the limits by which that perfect formation depending upon the more important characters is partially preserved, or entirely lost, according as the groups we examine are more or less in its vicinity. Let us select, for instance, such essential characters as strength and regular construction of the bill and foot, the powers of the voice, or the organs of digestion. We see the first of these characters, the perfect bill of the *Conirostres*, preserved in the neighbouring *Scansores*, though partially superseded by the use of the tongue in the *Picidæ* and *Certhiæ*, until it is entirely lost in the *Tenuirostres*, and the typical families of the *Fissirostres*. We see it again recovered in those aberrant families of that tribe which join the *Dentirostres*, where the perfect form re-appears, though the strength is not equal to that found in the typical tribe of the order. The perfect foot again may be perceived to become in some measure defective in the *Scansores*, to be entirely lost in the types of the *Tenuirostres* and *Fissirostres*, and finally to be resumed as we come round by the *Dentirostres* to the tribe from which we set out. We may again mark out, on examining this diagram, how far the more perfect powers of voice that distinguish the typical groups of the *Conirostres*, are communicated to the neighbouring families on each side; such as the *Psittacidæ* among the *Scansores*, the *Merulidæ* and *Sylviadæ* among the *Dentirostres*; but how completely they are lost in the remoter families. The same observation may be made respecting the more extensive powers of digestion which distinguish the omnivorous families of the same typical tribe. These powers are perceived to be singularly deficient in the remote groups of

the *Tenuirostres* and *Fissirostres*, which for the most part confine themselves to one species of food, whether animal or vegetable. While the *Scansores* and *Dentirostres*, holding an intermediate station between the extremes, are intermediate also in the extent of their food ; fruit and berries being added to the animal food of the rest in some families, and in those more particularly which are contiguous to the omnivorous typical tribes.

The foregoing figure affords, moreover, an opportunity of observing some striking analogies between different groups in the order. It has been remarked by the author of the "*Horæ Entomologica*," who was the first to exhibit the relations of nature in a similar geometrical figure, and thus almost to reduce the science of natural history to geometrical precision, that, in figures constructed as the above, representing a series of circles united by affinities, the external groups of one circle always bear an analogy to the corresponding groups of those which are contiguous*. This analogous connexion serves to point out the causes of many important coincidences among the different groups of the *Insessores*. It explains the reason why the *Picidæ* on the one hand, and the *Trochilidæ* and *Cinnyridæ* on the other, families otherwise totally differing in their food and habits, should yet resemble each other in the common use to which they apply the tongue. It explains why the *Trochilus*, the *Hirundo*, and the *Caprimulgus* should be assimilated in the feebleness and almost uselessness of the bill ; that of the former being but a sheath to defend the tongue, that of the latter but a secondary fence to prevent the escape of the prey. It accounts for the characters of the genus *Hirundo* being so far transferred to the *La-*

* See *Horæ Entomologica*, p. 396, where the meaning of an *external* group is explained. In the foregoing diagram the *Picidæ*, *Cinnyridæ*, *Trochilidæ*, *Hirundinidæ*, *Caprimulgidæ*, *Laniadæ*, *Merulidæ*, *Sturnidæ*, *Corvidæ*, and *Psittacidæ*, are the *external* families. They comprise, in fact, the typical groups of each tribe.

niadæ as to confer the appellation of "*Piegrieches Hirondelles*" upon one of the groups of this family. It gives an equal insight into the reasons why the *Merulidæ* and *Sturnidæ* should have been so closely united in the earlier systems, and some of their various groups so frequently confounded together; why, in particular, Linnæus should have placed in one and the same genus the *Icteri*, that belong to the *Sturnidæ*, and the *Orioli*, that come naturally among the *Thrushes*; and why, again, *Pastor* and *Lamprotornis* should so long have retained their station in the latter group. The same consideration still further points out the cause of the similarity between the *Corvidæ* and *Psittacidæ* in their relative perfection of form and structure; and explains why the family of *Psittacidæ*, though not the most perfect or typical with reference to its own tribe, as it yields to the *Picidæ* in this point of pre-eminence, is yet more perfect and typical than that family with reference to the character of the order, in consequence of its analogy to the *Corvi*. Many other similar coincidences and similar analogies will suggest themselves to the reader here, as well as in the internal groups of the circles.

There is another point of view in which the foregoing diagram is of service to the inquiries of the ornithologist. It points out the union of different groups with respect to characters not sufficiently essential, or too artificial to form the basis of a natural arrangement; but which are yet important enough to force themselves upon our notice, and which have, in fact, formed in many instances the foundation of well-received systems. On consulting the above table, we shall perceive that the principles, which I have endeavoured to illustrate, provide for due attention being paid even to such minor characters by the juxta-position of the groups in which they predominate; and consequently, that the mode of grouping which these principles dictate, combines every advantage of artificial as well as of natural arrangement. Were
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we inclined, for instance, to fix our attention upon one character only, such as that of the powers of the voice, we might draw a line across the contiguous tribes of *Dentirostres*, *Conirostres*, and *Scansores*, which would separate into one group all the birds which are endowed with the faculty of singing or talking. The *Merulidæ*, *Sylviadæ*, *Fringillidæ*, the *Sturnidæ*, *Corvidæ* and the *Psittacidæ*, would thus be segregated from the rest as exclusively distinguished by these characters; the three former including all the birds which are capable of producing the notes peculiar to the class, the three latter all those which can imitate the voice of man. Were we, again, to make such a character as that of feeding on the wing the foundation of a group, we might equally set apart all the birds accustomed to that mode of life by a circular line, which would include within its circumference the contiguous families of *Cinnyridæ* and *Trochilidæ*, all the *Fissirostres*, together with the *Muscicapidæ*, in conjunction with the *Tyranni*, *Dicruri*, and the *Piegrieches* *Hirondelles* which adjoin them. We might resort to the same mode of grouping various contiguous families by means of such characters as climbing while they take their food, of using their tongues when feeding, of possessing gressorial feet, and numberless similar peculiarities both of anatomy and economy, on which I cannot at present dwell, but which will readily suggest themselves to the experienced ornithologist. It is thus, in fact, that by following not the arbitrary division of organs or properties, but their method of variation, we can reconcile the different modes in which systematists, from adopting partial views of their subject, have separated or united their various groups. And thus it is, that, while we admit their views to be partially correct, we have some grounds for drawing the conclusion, that the more comprehensive mode of combination which embraces all their various plans and reconciles their otherwise discordant systems, has some claim to be considered

considered as approaching most nearly to the general distribution of Nature. Let us refer to the foregoing table, and compare with it, for instance, the eleven orders into which M. Brisson distributed the birds which correspond with our *Insessores*. All his separate subdivisions, detached and unconnected in his system by any mutual bond of affinity, until here linked together in one uninterrupted series, may be recognised in the table before us, as forming contiguous groups, united by relations either of true affinity, or of apparent affinity, but real analogy. The same observations may be equally made with respect to the seven orders into which M. Temminck has separated the same tribes, the names of which, *Omnivores*, *Insectivores*, *Granivores*, *Zygodactyles*, *Anisodactyles*, *Alcions*, and *Chelidons*, will at once suggest those particular groups in the above figure with which they correspond. We may extend the same remarks, with some slight modification, to the two orders, and sixteen families into which M. Illiger has subdivided the same groups; to the two tribes and twenty-eight families of M. Vieillot; and the two orders and five families of M. Cuvier. It is particularly gratifying to be able to assert, that the two orders of *Picæ* and *Passeres*, into which Linnæus disposed the present families, also form contiguous groups in the foregoing figure, which divide it into two nearly equal departments. If we take away the *Laniadæ* from the families before us, which, it is to be recollected, that great naturalist arranged among his *Accipitres* in the last edition of his "*Systema Naturæ*," and draw a line which separates the greater part of the *Sturnidæ*, together with the *Fringillidæ* and *Loriadæ*, the whole of the conterminous *Dentirostres*, and the typical families of the *Fissirostres* which adjoin them, we have the Linnean *Passeres* grouped together on one side of the line, and the *Picæ* on the other. It is to be remembered, that the two orders of the Swedish naturalist have been pronounced by
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the highest authority, that of M. Cuvier*, to offer no decidedly distinctive characters by which they may be kept apart; and certainly, on considering the two divisions as they are distinguished from each other, the Linnean mode of grouping them appears at first sight to be perfectly arbitrary. Is it then to an accidental coincidence that we have to ascribe the singular conformity that thus presents itself between the views of Linnæus and those which are disclosed in the foregoing table of affinities? Or may we infer that this great inquirer into Nature had on this occasion pursued somewhat of a similar mode of consulting her, had obtained a glimpse of the same affinities by which she unites her groups, and of the same contiguous stations in which she disposes them—and that he drew his line of demarcation accordingly? I dwell with the more satisfaction on this point, as it confirms the views which I entertained when I ventured to differ from that great authority in uniting his two orders into one; and proves that my decision originated in no theoretical desire of limiting the orders of the class to five. I refrained, at the time I originally hazarded that opinion, from dwelling with any particularity on the chief reason that swayed me; I mean the necessity of preserving in one inviolate series the relations of affinity by which the entire of the group seemed united. I may now urge that argument with more consistency and more effect. What would then have been but mere assertion, has now somewhat of the authority of proof. And the reader who casts his eye over the foregoing table will acknowledge, that to withdraw any important department from the group, to make any material subdivision that would affect its integrity, would create a chasm in the now uninterrupted chain of affinities by which Nature seems to have brought her families together—would disturb the beautiful symmetry in which she

* See p. 403, Note *.

has combined them—and scatter the disjointed elements of an otherwise harmonious structure in endless and irretrievable confusion.

But there is another peculiarity attending the groups of *Insessores* on which I must detain the attention of my readers for a moment before I quit the order. It has been remarked by the author to whom I have so frequently alluded, and who, in the splendour which has attended his own progress, has diffused sufficient illumination around to direct the researches of his more humble fellow-labourers in the conterminous fields of science,—it has been remarked*, I say, by that accurate observer, that among the five subdivisions of any important and typical group, one will always be found to contain characters peculiar to this group itself, and the other four will represent the four contiguous groups that are of the same degree with it. The following series of parallel analogies, by which the tribes of the *Insessores* thus represent the different orders of the class, will tend to unfold many striking coincidences and reconcile many apparent anomalies in the groups of ornithology.

<i>Dentirostres</i>	RAPTORES.
<i>Conirostres</i>	INSESSORES.
<i>Scansores</i>	RASORES.
<i>Tenuirostres</i>	GRALLATORES.
<i>Fissirostres</i>	NATATORES.

The *Conirostres* are the typical group in the first series, and as such exhibit a character peculiar to themselves, the strength and more perfect formation of those organs, and the greater developement of those faculties which distinguish the *Insessores* from the other orders. The analogical relations that connect the other four opposite groups will serve to explain the cause

* See *Horæ Entomologica*, p. 518.

why the *Dentirostres* should be characterized by the *raptorial* peculiarity, the mandibular notch ; why some families of the tribe, even down to the smallest *Pari**, should have a tendency to attack and prey upon the weaker animals ; and why, from their conformity in such habits, the *Laniadæ* should have been so frequently confounded with the groups of the *Raptores*. They demonstrate the cause why such birds as the *Musophaga* and *Corythaix*, so nearly and evidently allied to the *Gallinaceous* families, should be found among the *Scansorial* ; and why the *Scansores*, to make a selection from many characters which they possess in common, should be distinguished by the short wings and heavy flight that characterize the *Rasores*. They explain the identity that exists between the typical families of the *Tenuirostres* and the *Grallatores* in the *suctorial* manner of obtaining their food, and the cause why both should be distinguished by a corresponding length and slenderness of bill. The same considerations of analogy illustrate the general tendency which the families of the *Fissirostres* exhibit to resort to the neighbourhood of waters ; why their nests should be so frequently constructed in their vicinity ; why the *Hirundo* should pursue its prey along their surface, and the *Halcyon* seek its food from their depths. They explain, on the other hand, why the wide gape and short tongue of the *Fissirostral* families should be observable in the *Pelicanidæ*, and the consequent conformity that exists between the two groups in their mode of gulping down their prey ; why the *Terns* should be commonly denominated *Sea-swallows* ; and why the variation in the form of the tail among the *Perching* birds which feed upon the wing, should be equally discernible among the *Natatorial* families ; the *Phaeton* and *Tachypetes* exhibiting

* Ils (les *Mesanges*) se nourrissent d'insectes, — les petits oiseaux maladifs devient aussi leur proie, elles les achèvent en leur ouvrant la crâne.—*Temm. Man. d'Ornith.* p. 286.

the extremes of that varied structure. With almost equal certainty they reduce to the regularity of law the otherwise anomalous formation of the *Tachypetes*, explaining its connexion with *Hirundo*, and accounting for the weak and feathered legs, the forked tail, the expansive wing, the powers of the long-suspended flight, which give each bird the command over the element in which they range in common. But I must restrain myself, or I should be involved in an endless discussion of similar coincidences. It is sufficient to have suggested the principles that regulate such analogies, and the intelligent ornithologist will himself discern the numberless and beautiful inferences that result from them. Proceed we now in order to the next succeeding department of the class.

Ord. III. *RASORES*.

The two typical orders which have already come before us exhibit the most generally perfect structure that is found among birds, and consequently indicate the most extensive powers, and the widest sphere of action. The strength and perfect developement of their wings confer on them the faculty of locomotion to the fullest extent; while the structure of their foot affords them equal facility in grasping their prey, in walking, climbing, and perching. They thus extend their dominion over nature almost without any apparent limits. The different elements seem alike subservient to their purposes: on land, they form their habitations and obtain their food in the forest, on the plain, and the mountain; they pursue their prey through the tracts of air, and are not debarred even from the waters. Pursuing the same line of inquiry among the aberrant groups of the class, we may observe their powers which depend on conformation becoming more circumscribed, and their sphere of life brought conse-

quently within narrower limits. As we approach the *Rasores*, the order into which the plan of our inquiries now introduces us, we may at once notice the short wings and heavy mode of flight which prevail throughout the generality of the families that compose it; and we may even observe this deficiency still further becoming more evident, until the faculty of flying is entirely lost in one of the most conspicuous groups of the order. If we examine the internal anatomy of these birds, we shall perceive that, as far as it is conducive to the faculty of flight, it evinces a still more striking deficiency, than even their external appearance. Perhaps the most essential distinction between birds and the other vertebrated animals consists in the powers of their wings; and the difference in their osteology is conformable to this characteristic distinction. Their skeleton differs from all others by the peculiar formation of two important bones, the *os furcatorius* and the *sternum*, to which the muscles of the wings are attached. The first of these bones is always more or less robust in itself, and more or less strongly connected with the *sternum*, according as the bird possesses more or less capability of flight; and the latter is furnished with a projecting process or keel, which is also more or less elevated, according to the greater or less prevalence of the same capability. Now, on examining the *Gallinaceous Birds*, we find that these bones in general are small and feeble. The *os furcatorius* is attached to the *sternum* by a weak ligament; and the *sternum* itself is diminished in extent by a groove on each side, which considerably affects its strength. In one of the families of the order, the *Struthionidæ*, both the *os furcatorius* and the projecting keel of the *sternum* are entirely wanting, and the *sternum* itself, assuming the appearance of a simple flat buckler, exhibits the rudiments only of that structure which is peculiar to birds. The insufficiency of these members to support the birds of the order before us to any height, or for
any

any constancy, in the air, indicates their station in nature to be chiefly limited to the ground. And suitably to that wise and merciful disposition prevalent throughout the creation, which compensates for every deficiency by some counterbalancing advantage, those parts of the structure of the *Gallinaceous Birds* which are more necessary to them in their peculiar station, and more conducive to their support in life, are endowed with superior strength and powers in proportion to the inferiority which may exist in the organs of flight. Their legs and feet are strong, and furnished with the most powerful muscles; their nails are short, blunt, and robust, for the purpose of scratching up their food; and a connecting membrane unites the base of the toes sufficiently developed to strengthen their action, but not sufficiently extensive to interfere with the freedom of the joints. The form and situation of the hind toe is especially suited to their station in nature. In reference to its general use, this member seems chiefly calculated to aid the foot in grasping an object; and thus it is of important service to a bird in holding its prey or in perching. But neither of these purposes is suited to the mode of life of the *Rasores*; and the perfect developement of the member in question would proportionally diminish the strength of the fore toes, as well as impede the progress of the bird upon the ground. The more, therefore, that we perceive the strength of the hind toe to be transferred to those in front, the greater may we pronounce the powers of the rasorial foot to be in its own peculiar region, and the closer its adaptation to the habits of running that characterize these groups. In fact, we may observe that the more typical *Rasores* seldom walk, but are found almost invariably to run even in their most ordinary movements. In this point of view the hind toe, although an apparently trivial and unimportant member, becomes of considerable consequence in affording a character to judge of the relative situation of the different families in
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the order. Keeping, then, these characteristic peculiarities of the *Rasores* steadily in view, we may draw the conclusion that the typical groups will be those which, in reference to external character, may be distinguished by the weak conformation of the *hallux* or hind toe, and the height on which it is articulated upon the *tarsus*. The aberrant groups will in like manner be either those whose hind toes are more developed, and articulated lower down upon the *tarsus*, and which thus retain most closely the habits of the *Perchers*; or those which, though they possess no hind toe, and thus seem to partake most strongly of the typical character of the order, are yet found to deviate from it in the length of the *tarsus*, by which character they lead off to the *Waders*. Following these views of arrangement, we may group the *Rasores* as follows, placing the typical families in the centre*:

Columbidæ, Leach.

Phasianidæ.

Tetraonidæ, Leach.

Struthionidæ.

Cracidæ.

I have already observed, when speaking of the affinities which connect the orders of Birds together, that the *Columbidæ* form the passage from the *Insessores* to the *Rasores* by their habits of perching and their powers of flight. The hind toe is articulated as in the *Perchers*, and their *tarsi* are shorter, more particularly in the

* Or, with reference to their normal and aberrant groups, thus:

<i>Normal group.</i>	
Halluce brevi, amotâ; tarsis præcipue calcaratis . . .	{ <i>Phasianidæ</i> . <i>Tetraonidæ</i> .
<i>Aberrant group.</i>	
Halluce aut nullo, aut plus vel minus terræ incumbente; tarsis nunquam calcaratis.	{ <i>Struthionidæ</i> . <i>Cracidæ</i> . <i>Columbidæ</i> .

earlier

earlier groups, than those of the *Gallinaceous Birds* in general. The first group which we meet in this extensive family is the genus *Vinago* of M. Cuvier, the bills of which, stronger and more solid than they are usually found to be among the Pigeons, unite them to *Penelope* and *Crax*, which form the opposite extreme of the present order, as well as to *Musophaga* and *Corythaix*, which approach, as we have seen, the whole of the groups before us, and connect them with the *Perchers*. From this genus *Vinago*, which seems confined to the southern divisions of the Old World, we may observe a series of groups leading gradually to the true *Columba*, of which genus the European species *C. ænas*, Linn. may be considered to form the type. Hence we are led by several intervening species to the "*Columbi-Gallines*" of M. Le Vaillant, which, still retaining the soft and flexible bill of *Columba*, approach the typical *Gallinaceous Birds* in their more elevated *tarsi*, and in their habits of living in company and seeking their nourishment chiefly on the ground. Among these may be noticed some forms, *C. Nicobarica*, Linn., and *C. carunculata*, Temm., for instance, which possess the feathered appendages, together with the naked face and caruncles of the Linnean *Gallinæ*; and another group, the *Lophyrus* of M. Vieillot, which exhibits the size and general form of the same birds, as well as the singular plumes which frequently decorate their head. This last-mentioned genus, formed of the *Crowned Pigeon* of India, possessing the strongly-formed leg and foot of *Meleagris*, Linn., but without the spurs, while at the same time it retains the bill of *Columba*, may be observed to open the passage immediately from the present to the succeeding family.

The genus *Meleagris* thus introduces us into the family of *Phasianidæ*. In conjunction with *Pavo*, Linn., and *Polyplectron*, Temm., that genus commences the present group by the greater length of the hinder toe, in which character it resembles the

the family we have just quitted, with the exception of its being articulated higher on the *tarsus*. The genus *Lophophorus* of M. Temminck, which is represented by the *Impeyan Pheasant* of our cabinets, and the genus *Gallus* of M. Brisson, appear to hold an intermediate station, with respect to these characters of the hind toe, between the groups just mentioned and the true *Phasianus*, which forms the type of the family. Some groups deviating from the latter genus, among which is the *Argus* of M. Temminck, unite themselves to *Numida*, Linn., by the absence of the spur on the *tarsus*. The last-mentioned genus re-conducts us again to *Meleagris*, which it resembles in general appearance, while at the same time it approaches it with reference to the integrity of the *tarsus*, that of the true *Meleagris* possessing but a short and blunt excrescence, which exhibits only the rudiments of a spur.

The groups of the *Tetraonidæ* are chiefly distinguished in modern systems from those of the *Phasianidæ* by their more simple appearance ; by the absence, in fact, of those ornaments to the plumage, and those naked or carunculated appendages to the cheeks and head, so conspicuous in the latter family, but which are reduced in the present to the mere space that encircles the eye. The still weaker conformation of the hinder toe tends further to separate them. In the *Tetraonidæ* this member becomes shorter and gradually weaker, until it is completely lost in some of the groups. In this point of view the family before us holds an intermediate station between the *Phasianidæ*, where the hind toe, although articulated high on the *tarsus*, is yet comparatively strong, and the *Struthionidæ*, where it is generally, if not always, deficient. The groups that compose the *Tetraonidæ*, corresponding with those which form the genus *Tetrao* of Linnæus, seem to be immediately united to the preceding family by means of the genus *Cryptonyx*, Temm., which resembles

resembles them in the similar appendage to the plumage of the head. This group leads directly to *Coturnix*, Briss., and the true *Perdix*, where it has indeed been generally arranged, and from which it has been chiefly separated by the defalcation of a nail to the hinder toe. From *Perdix* we proceed to *Pterocles*, Temm., which, by its half-plumed *tarsus*, is intermediate between that genus and the true *Tetrao*. By means of *Lagopus*, Cuv., in which the toes as well as the legs are feathered, we arrive at the singular genus *Syrrhaptes* of M. Illiger, which is immediately connected with the *Ortygis* of the same author, by the entire deficiency of the hind toe. With these groups the genus *Tinamus*, Lath. corresponds by the slight conformation of the same member, the joint of which is feeble, and the nail scarcely developed. This group leads us back again to *Cryptonyx*, which we may remember has no nail to the joint of the hinder toe. The whole of these last-mentioned groups thus united correspond also in the shortness and weakness of their tails.

Those birds of the latter family, which exhibit a weakness or a deficiency in the hinder toe, lead us at once to the three-toed groups of the *Struthionidæ*, with the bills of which, more particularly that of *Rhea*, those of some species of *Tinamus* correspond*. This family contains the "*Brevipennes*" of M. Cuvier, together with the genus *Otis* of Linnæus, which evidently agrees with them in their principal characters. It corresponds also with the order "*Cursores*" of M. Temminck, with the exception of the genus *Cursorius* of Dr. Latham, which possesses more of the characters of the *Wading* than of the *Gallinaceous* order; but with which the present family will still be found to preserve its affinity by means of that circular disposition which has hitherto been seen to prevail throughout the divisions of ornithology.

* *Rostri* (sc. *Crypturi*, Ill., *Tinami*, Lath.,) mira conformitas cum rostro *Rheæ* est. Illiger, *Prod.* p. 245.

The chief genera comprised in the *Struthionidæ* are the *Rhea*, Briss., which unites this family with the last; the *Struthio*, Linn., which having but two toes, and thus carrying the character of the group to the extreme, may be considered the type; the *Casuarius*, Briss., *Dromiceius*, Vieill., and *Otis*, Linn. Considerable doubts have arisen as to the present existence of the Linnean *Didus*; and they have been increased by the consideration of the numberless opportunities that have latterly occurred of ascertaining the existence of these birds in those situations, the Isles of Mauritius and Bourbon, where they were originally alleged to have been found. That they once existed I believe cannot be questioned. Besides the descriptions given by voyagers of undoubted authority, the relics of a specimen preserved in the public repository of this country bear decisive record of the fact. The most probable supposition that we can form on the subject is, that the race has become extinct in the before-mentioned islands, in consequence of the value of the bird as an article of food to the earlier settlers, and its incapability of escaping from pursuit. This conjecture is strengthened by the consideration of the gradual decrease of a nearly conterminous group, the *Otis tarda* of our British ornithology, which, from similar causes, we have every reason to suspect will shortly be lost to this country. We may, however, still entertain some hopes that the *Didus* may be recovered in the south-eastern part of that vast continent, hitherto so little explored, which adjoins those islands, and whence, indeed, it seems to have been originally imported into them. I dwell upon these circumstances with more particularity, as the disappearance of this group gives us some grounds for asserting, that many chasms which occur in the chain of affinities throughout nature may be accounted for on the supposition of a similar extinction of a connecting species. Here we have an instance of the former existence of
a species

a species that, as far as we can now conclude, is no longer to be found; while the link which it supplied in nature was of considerable importance. The bird in question, from every account which we have of its economy, and from the appearance of its head and foot, is decidedly gallinaceous; and, from the insufficiency of its wings for the purposes of flight, it may with equal certainty be pronounced to be of the *Struthious* structure, and referable to the present family. But the foot has a strong hind toe; and, with the exception of its being more robust,—in which character it still adheres to the *Struthionidæ*,—it corresponds exactly with the foot of the Linnean genus *Crax*, that commences the succeeding family. The bird thus becomes osculant, and forms a strong point of junction between these two conterminous groups; which, though evidently approaching each other in general points of similitude, would not exhibit that intimate bond of connexion which we have seen to prevail almost uniformly throughout the neighbouring subdivisions of nature, were it not for the intervention of this important genus.

The family of *Cracidæ*, thus connected with the *Struthionidæ*, are separated from the typical groups of the order by the length and robustness of the hinder toe, and by its being situated more nearly on a level with those in front. These birds, placed in this manner at the extreme of the present order, assume more of the habits and appearance of the preceding order of *Perchers* than the other *Rasores*, with the exception of the family of *Columbidæ*. They are found most frequently to make their abode in trees, and to resort to the neighbourhood of forests: in the lesser number of their tail-feathers they evince an equal deviation from their more typical congeners, and they never possess a spur. This family contains the *Ourax* of M. Cuvier, and the true *Crax*, Linn., together with the *Penelope* and *Ortalida* of M. Merrem. The two latter genera have their hind toe articulated on a

level with the front toes, and thus reconduct us to the *Columbidæ*. Their bills also, more lengthened than those of *Crax*, approach most nearly to those of the *Pigeons*, which, on the other hand, seem to meet them by the stronger form and curvature of the bill of *Vinago*, which deviates in these particulars from the general structure of its own family. The genus *Ortalia* in particular, the feathered cheeks of which are distinguished from the naked face of *Penelope*, brings us in immediate contact with that family. Here it is, in this extreme of the order, that I would assign a place to the beautiful New Holland genus *Menura*, Lath., a group that has hitherto afforded more difficulties to the systematic writer than any other in the class. By modern authors it is generally placed among the *Perchers**, on account of the length and low position of the hind toe. But its habits and manners are gallinaceous, as far as we can ascertain†, and its general appearance decidedly evinces an affinity to the *Rasores*. The deviation in the structure of the foot from that of the typical *Rasorial* groups only indicates its being placed at a distance from them, and in that extreme of the order which connects itself with the conterminous order of *Perchers*. The same deviation, it has been seen, is found in other groups of its own family, and in the adjoining family of *Columbidæ*. A group

* M. Temminck places this genus in his order "*Insectivores*" in the midst of the *Thrushes*, and in the following succession: *Turdus*, *Cinclus*, *Menura*, *Pitta*, &c. (*Man. d'Orn.* p. lvi.). M. Cuvier assigns it a nearly similar situation (*Regne Anim.* i. p. 361.). M. Vieillot, on the other hand, though he includes it in his second order, which corresponds with our *Insessores*, places it at the extremity of it, and near the groups of the *Columba* and *Penelope*. (*Analyse d'une Nouv. Orn. Elem.* p. 48.). His views thus nearly correspond with mine. M. Illiger has at once ranked it with the *Rasores*. (*Prod. Mam. et Av.* p. 241.).

† Mr. Caley informs me, that, from the observations he was enabled to make on these birds during his stay in New Holland, it is his opinion that they are gallinaceous. He generally found them, he tells me, in flocks, and for the most part on the ground.

newly

newly discovered in some islands of the Eastern Archipelago, the *Megapodius* of M. Temminck, serves strongly to illustrate these principles, and to corroborate my opinion as to the situation of the singular New Holland genus before us. The *Megapodius*, brought home to France by one of her late expeditions, is confessedly gallinaceous in its habits, and as such has been placed without hesitation among the true *Rasores*; and yet its foot is precisely of the same construction* as that of *Menura*. The bill also shows no very material difference from those of the extreme groups of the *Cracidae*. To return, however, to the general affinities of the family, it may again be repeated, that all the latter genera, thus united among themselves, evince an evident approach to the *Columbidae*, from which, it may be remembered, we commenced our observations on the order. The whole of the groups of the *Rasores*, thus following each other in continued affinity, preserve their circular succession without interruption.

Ord. IV. GALLATORES.

The birds of the next succeeding order, another of the aberrant groups of the class, exhibit an equally circumscribed sphere of action as those of the order we have just quitted. Holding an intermediate station between the *Gallinaceous* birds, which we have observed to be confined to the land, and the *Natatorial* groups, which are confined to the water, their typical groups

* "Tous les doigts (sont) longs, le posterieur posant à terre dans toute sa longueur." *Temm. Art. M. Freycineti*. Pl. Col. 220.—The habit of these birds of leaving their eggs on the ground and deserting them, unlike the typical groups of the order, affords an additional reason for placing them in an extreme division. In this respect they evince an affinity to some of the *Struthionidae*, another aberrant group. See *Temm. ubi sup.*, and *Cuv. Regne Anim.* i. p. 461.

appear

appear to be those which partake most equally of the advantages of both elements ; and the aberrant groups those which discover a more predominant inclination to either. Of the five families into which the order before us branches out, we may, in this point of view, pronounce those two to be most typical which inhabit the land, but derive their support from the water ; or, to speak more correctly, which derive their whole support from the latter element, without possessing those powers of swimming or diving which are peculiar to the true water-fowl. The exclusive food of such groups will be fish, water reptiles and insects, mollusca, and animalcula ; and their distinguishing external characters, length of legs and bill,—the former for the purpose of wading, the latter for that of seizing their prey, or of extracting it by suction from the waters or marshes. Of the three remaining families, two, as I have observed in an early part of this inquiry, will be found to deviate from the more typical, in their food and manners being more terrestrial, and their general appearance and structure more conformable to that of some groups of the preceding order of *Rasores* : while the third, by its capability of swimming and the rudiments of the natatorial membrane that connects the fore toes of some of its species, equally deserts the same type, and goes off, on the other hand, to the *Natatores*. Taking these peculiarities into consideration, we may venture to view the order according to the following arrangement, placing as usual the more typical families in the centre* :

* The following disposition distinguishes the normal and aberrant families :

<i>Normal group.</i>	
Rostris longis, ad sugendum præ-	{ <i>Ardeidæ.</i>
cipue idoneis	
	{ <i>Scolopacidæ.</i>
<i>Aberrant group.</i>	
Rostris brevibus, ad captandum,	{ <i>Rallidæ.</i>
haud sugendum idoneis . .	
	{ <i>Charadriadæ.</i>
	{ <i>Gruidæ.</i>

Gruidæ.

Gruidæ.

Ardeidæ, Leach.

Scolopacidæ.

Rallidæ, Leach.

Charadriadæ, Leach.

The species that enter into the family of *Gruidæ*, most of which were comprised originally in the genus *Ardea* of Linnæus, are separated from the remainder of that group by their food, which is chiefly vegetable ; their manners, in which they approach nearer the land-birds ; and the formation of their bills and feet, the former of which are more obtuse at the end, and the latter more short than is observable in the true *Ardeæ*. In these characters, as well as in their general appearance, more particularly with respect to their plumage, they have a near alliance, as has been elsewhere observed, with the *Struthionidæ* of the preceding order. The first group that meets our attention in this family is the *Psophia* of Linnæus. This genus, in the comparative shortness of the bill, is connected with *Anthropoides* of M. Vieillot, the type of which is the *Demoiselle* of Numidia so distinguished in our menageries by its graceful form and gestures. The *Crowned Crane* of Africa, equally familiar to our cabinets and menageries, the *Ardea pavonina* of Linnæus, unites this genus to the true *Grus* of the present day. If the genus *Dicholophus* of M. Illiger be found to belong to the *Wading Birds*, of which I have little doubt, its situation will most probably be in the present family, to which it bears a nearer resemblance in plumage and general structure than to any other division of the order. In this case it will form a more immediate link than any group at present known in the family with the *Charadriadæ*, which meet it at the corresponding extreme of the order ; its shorter and more elevated hind toe forming the passage between the fully tetradactyle foot of the *Gruidæ*, and the tridactyle foot of the *Charadriadæ*.

M. Cuvier

M. Cuvier has noticed* the union that takes place between the last groups and those of the *Ardeidæ* by means of the genera *Aramus*, Vieill., and *Eurypyga*, Ill. These lead to the extensive assemblage of species contained under *Ardea*, Linn., and *Ciconia*, Briss., both of which groups are connected by their general form and habits, but differ by some minute yet strongly-marked generic distinctions. Intermediate between *Ardea* and *Ciconia* appear those forms which display so remarkable a dilatation of bill, the *Cancroma*, *Phænicopterus*, and *Platalea* of Linnæus. The two last of these groups are equally distinguished by a greater developement of the membrane that connects the toes, than is observable in the other *Waders* which join them on each side; and in one of them, the *Phænicopterus*, this character is carried so far to the extreme, as to have occasioned some systematists to place the birds of the genus among the *Natatores*. But the whole of the family have a membrane more or less extensive at the base of the toes: and if we compare the feet of the common *Ciconia alba*, of the *Platalea*, and the *Phænicopterus* together, we shall see a gradual increase of this membrane in extent until it reaches the extreme in the latter genus. Among the groups that are allied to *Ciconia*, there are many that resemble it in general character, but deviate from it by the form of the bill. Among these we may particularize *Scopus*, Linn., distinguished by its more compressed and furrowed mandibles; the *Mycteria*, Linn., where the point of the bill turns upwards; and the *Anastomus*, Ill., where the mandibles, united at the base and the point, leave an open space in the centre. The genus *Tantalus*, Linn. bears an evident affinity to the same group, and has consequently been united to it in the arrangement of every systematic naturalist. It differs chiefly by the downward curvature of the bill. To this genus may be united the *Ibis* of M. La-

* *Regne Anim.* i. p. 473.

cepede, which in its more slender bill bears an affinity to *Eurypyga*, from whence we commenced our inquiries into the family.

Proceeding in the same course of observation, we may trace out the distinction between the family of *Scolopacidæ* and the groups we have just quitted, in the weakness and elevation of the hinder toe, and the slenderness and flexibility of the bill. The latter character is more particularly conspicuous in the typical species, which make use of the flexible bill in penetrating the mud and soft spongy marshes whence they extract the worms, insects, smaller mollusca, and animalcula, that chiefly constitute their food. The family is united to the *Ardeidæ* by means of *Numenius*, Briss., which approaches *Ibis* most closely in its bill. By means also of the immediate connexion of *Ibis* with the genera *Eurypyga* and *Aramus*, the *Scolopacidæ* preserve their affinity to those groups, with which indeed their appearance has generally associated them. This may be inferred from the generic or specific name originally conferred upon each of these groups; the former genus being formed of the *Scolopax helias* of M. Pallas, or the *Caurale Snipe* of Dr. Latham's *Synopsis*; and the latter of the *Ardea scolopacea* of Linnæus. We cannot have a more accurate guide through the affinities of this extensive family than M. Temminck, whose opportunities of observing the habits and characters of the birds of the present order have been so extensive, and whose ability and industry in improving these opportunities have been so fully exerted, as to leave little room for further observation on the subject, as far at least as regards the European species. Following his views, with some slight modification, we may remark, that from *Numenius* we pass on to *Totanus*, Briss., the bill of which, comparatively robust at the point, holds a middle situation between the strong bill of that genus and the entirely flexible bill of *Limosa*, Briss. The genus

Recurvirostra of Linnæus appears to come naturally among these groups, and to be intermediate between *Totanus* and *Limosa*; with the former of these it is connected by the structure of the foot, the *Totanus semipalmatus* of M. Temminck almost immediately meeting it; while with some species of the latter it is equally associated by the turned-up bill. The latter genus, *Limosa*, unites itself to the true *Scolopax*, Auct., by the flexible nature of its bill; a character which prevails through the remaining groups of the family. *Scolopax* leads to *Tringa*, Linn., through the medium of *Rhynchæa*, Cuv., which approaches the whole of the latter genus by its shorter bill, and agrees in particular with some species of it which have that member feebly curved, by the slight curvature observable at the extremity of its own. Among the groups which originally composed the *Tringa* of Linnæus, the *Phalaropus* of M. Brisson may be distinguished, which, by its lobated feet and habits of swimming, stands at the extremity of the present groups, and leads the way to the succeeding family of *Rallidæ*. The present family is united at its extremes, and the circular succession of affinities between its various groups is preserved, by means of some species of *Tringa*, whose curved bills lead back to *Numenius*, from which we started. The *Tringa platyrhyncha* of M. Temminck, the same as the *Numenius pygmaeus* of the "*Index Ornithologicus*," completes the circle.

The family of *Rallidæ*, composed of the Linnean genus *Parra*, with its congeners *Palamedea*, Linn., and *Chauna*, Ill., together with *Rallus*, Linn., and *Fulica*, Linn.*, corresponds with the *Macroductyles* of M. Cuvier. These groups are distinguished from the last family by their stronger bill and the greater length of the hind toe. They are also separated from the other birds of the order, and united among themselves by the shape of their

* I conjecture that *Chionis*, Forst. comes into this family; but I know too little of the group to speak with any confidence.

body, which is compressed and flattened on the sides, in consequence, as M. Cuvier has informed us, of the narrowness of their *sternum*. Were we here allowed to draw an inference from the analogical construction of other bodies, which move with the greater facility through the water in proportion as they assume this compressed and keel-like form, we might almost conclude that this structure, peculiar to the birds of the present family, facilitates their progress through that element*, and is intended to counterbalance the deficiency in the formation of the foot, which separates them from the truer and more perfectly formed Water-birds. It is certain that the greater portion of these birds are excellent swimmers; and in such habits, as well as in the shortness of their *tarsi*, which is equally conducive to their powers in swimming, they are found to deviate from all the remaining groups of the order. They thus become an aberrant family, and lead directly, as has been before noticed, to the succeeding order of *Natatores*. The genus *Parra*, Linn., distinguished from *Rallus*, Linn. by the greater length of the toes, and more particularly by the length and straightness of the nails, is yet allied to that genus by the general structure of the bill. With *Parra* may be allied *Palamedea*, Linn., and *Chauna*, Ill., the *Parra chavaria* of the "*Systema Naturæ*," both of which seem to approach *Parra* in affinity, although the latter of them is so imperfectly known that its situation cannot be decided with certainty. To *Rallus* succeeds *Crex*, Bechst., which by its stronger and shorter bill seems to lead on to *Gallinula*, Briss., from which genus, although agreeing with it in general appearance, it is decidedly separated by its terrestrial habits. *Gallinula* is set apart from the foregoing groups by the greater length of the toes, and the dilatation of the upper mandible upon the forehead. This

* Mr. Wilson, speaking of the *Rallus Virginianus*, mentions this character as conducive to the progress of the bird through the reedy marshes. *Am. Orn.* vol. vi. p. 33.

latter character is still further developed in the ensuing genus *Porphyrio*, Briss., where the base of the bill exhibits a considerable degree of robustness ; and is also carried on to *Fulica*, which immediately adjoins *Porphyrio*. The species that compose the true *Gallinula* and *Porphyrio* may be observed to possess a narrow membrane on each side of the toes, which extends along their whole length, straight and entire. We thus recognise the gradual approximation of these genera to the lobated foot of *Fulica* and *Podoa*, which unite the swimming *Waders* to the true web-footed *Natatores*. The dilatation of the upper mandible into a flat crown upon the forehead, which characterizes the latter groups of this family, together with the same length of the toes, is found to exist in some species of *Parra* ; and thus we are led back to the groups from which we commenced our observations on the family.

We are introduced to the family of *Charadriadæ*, or the three-toed Waders, by means of *Hæmatopus* of Linnæus, which indicates its affinity to the lobated *Fulica* of the last division by the rudiments of the membrane that extends along the toe. This character is sufficiently discernible in the species so frequent on our coasts ; but it is so far conspicuous in an Australasian species as almost to give its foot the appearance of being perfectly lobated. This genus by its habits of swimming preserves an affinity with the natatorial groups of the preceding family of *Rallidæ* ; and these again being connected with *Phalaropus*, which forms an extreme genus of the *Scolopacidæ*, the whole of the *Wading Birds* that possess the faculty of swimming are brought together into one contiguous group. Besides *Hæmatopus*, the present family consists of *Arenaria*, Briss., our common *Sanderling* ; to which I feel inclined to add *Strepsilas*, Ill., and *Vanellus*, Briss., which have been separated from *Tringa* and generally assigned a place near *Arenaria*. It is true that both these genera possess
a hind

a hind toe ; but that member is at the same time so small and feeble, as scarcely to form more than the rudiments of a toe : and in the structure of their bill, and more particularly in their habits, they evince a more natural union with the present family than with *Tringa*, where a strict adherence to the structure of the foot would place them. The genus *Cursorius*, Lath. also appears to come among these groups which are joined by the true *Charadrius*, Auct. Among the numerous species of this latter genus, some will be observed to be distinguished from the rest by the greater elevation of the *tarsi*. These lead us to the genus *Himantopus*, Briss., which exhibits such a singular and apparently disproportioned length of limb. The family is terminated by the *Ædicnemus* of M. Cuvier, which, by its affinity with the earlier groups of the *Gruidæ*, connects the present family with that which commenced the order. We may remember that the family of *Struthionidæ* among the *Rasores* is closely allied to the *Gruidæ* of the order before us, and equally so to the *Charadriadæ*, in consequence of the absence of the hinder toe. With the latter indeed it is frequently united into one group, from their similarity in this character, and the cursorial habits resulting from it, which are common to both. These three naturally allied families therefore are thus brought into contact, and their mutual affinities preserved ; while at the same time they retain in the system the various stations into which the difference in their more important characters tends to separate them.

Ord. V. NATATORES.

The groups of the preceding order, that deviate from the typical character by their habits of swimming, naturally lead us, as I have so often repeated, to the fifth or last order of *Natatores*.

The

The former groups, however, still retain their relation to the typical families of their own order, by frequenting for the most part the inland lakes or rivers. The birds upon which we now enter become more decidedly pelagic in their food and habits; their typical station in nature appears included within the limits of the ocean, and their "business is in the great waters." We may have remarked in the course of this inquiry, that the typical families of an aberrant tribe or order are less perfect in their general conformation, than the families of the same group which deviate from the type. This is necessarily the case. The tribe or order is itself aberrant, and deviates from the more perfect structure of the continuous tribes or orders that are typical in the more comprehensive division under which all are classed. The typical subdivisions of this aberrant tribe or order will consequently be those which carry this deficiency to the extreme. In reference then to their own division, the typical perfection of such aberrant groups will consist, if I may so express myself, in their general imperfection—their strength will be in their weakness. To instance this point we may refer to the order of *Insessores*, where the typical families of the two most aberrant tribes, the *Tenuirostres* and the *Fissirostres*, exhibit less general perfection of structure than the families which are less typical. In the former instance the *Cinnyridæ* and *Trochilidæ*, the types of the tribe, evince in their general organization a considerable degree of feebleness, both in their bills and legs, in comparison with the strength displayed in many groups of the aberrant *Meliphagidæ* and *Nectariniadæ*. We may observe the same character in the tribe of *Fissirostres* also, where the general weakness of the structure of the typical *Hirundinidæ* and *Caprimulgidæ* forms a striking contrast with the comparative strength and robustness of many species of the remoter groups *Todidæ*, *Meropidæ*, and *Halcyonidæ*. The prevalence of this principle in the groups that have already come before

before us directs us at once to the typical families of the present order. The groups that are most truly oceanic will be those which exhibit the greatest deficiency in their powers of flight and of motion on land. Thus in the typical *Natatores*, the backward position of the legs, which are thrown entirely behind the equilibrium of their body, almost totally deprives them of the faculty of walking; while their wings, considerably shorter, and less covered with feathers than those of any other birds whatever, bespeak their incapacity of maintaining a constant or sustained flight. On the other hand, these birds exhibit a superiority in the powers which contribute to their support in their own peculiar element. The feet, which by their position and structure are not calculated for the usual offices which these members perform on land, are admirably adapted to the purposes, more appropriate to the *Natatores*, of swimming and diving. In the same way the wings, which serve as feeble supporters in their progress through the air, answer admirably as fins to facilitate their movements in the water. Those birds then will form the typical groups of the present order, which, like the *Colymbus* and *Alca* of Linnæus, have short and slightly-feathered wings, and whose legs are so far thrown backward as to give them an almost erect appearance when on the ground. They will be found to be constant inhabitants of the ocean; and although in some instances, as the *Aptenodytes* of Linnæus, they are deprived of the powers of locomotion common to other birds, by the deficiency of their wings, they may yet pursue their prey at considerable distances from land. To such situations they must of course be conveyed by their superior powers in swimming. The aberrant groups, on the other hand, will be those where the powers of the wings are more considerably developed, and where the legs, thrown more forward, enable them to walk with comparative ease. They thus appear in general to come more near the land-birds than the typical families of the order.

order. Some, as for instance many groups of the Linnean *Anas*, like the *Rallidæ* of the preceding order, prefer the inland lakes and marshes to the oceanic waters ; while others, as some groups of the *Larus* of the same author, are observed to feed occasionally on land. Many other deviations from the type of the order, and many approximations to the conterminous orders on both sides, will appear conspicuous as we enter into the details of the several families. The following seems to be the order of succession among these families, the names of which are taken as usual from that of the Linnean genus, which is typical in each*.

Anatidæ, Leach.

Colymbidæ, Leach.

Alcadæ.

Pelecanidæ, Leach.

Laridæ, Leach.

The family of *Anatidæ*, to which we have been led from the preceding order by means, as was originally observed, of the connexion between the *Rallidæ* and *Cereopsis*†, consists of the groups which compose the Linnean genera *Anas* and *Mergus*. It is not my intention at present to enter into any observations upon the different views which have been entertained by naturalists with respect to the classification of the former extensive genus ; or to discuss the merits of the several generic divisions that have been made in it in consequence of the various distinctions in the bills and feet of the species, and the equal differences in their

* Or with reference to the typical groups :

Normal group.

Alis brevibus, parçè plumatis: pedibus	{	<i>Colymbidæ</i> .
extra equilibrium corporis positis .		<i>Alcadæ</i> .

Aberrant group.

Alis longioribus, plumatis : pedibus	{	<i>Pelecanidæ</i> .
præcipuè intra equilibrium corporis		<i>Laridæ</i> .
positis		<i>Anatidæ</i> .

† See p. 416.

habits.

habits. I shall only remark, with respect to the affinities that prevail throughout the families of this order, that the more extensive subdivisions of the Linnean *Anas*, which have been acknowledged by all systematic writers, either under the name of sections or genera, display in conjunction with *Mergus* a regular series of affinities conformable to the principles I have ventured to advance as regulating the order. The first group upon which we enter in this first aberrant family of the order, has been formed into a sectional subdivision by M. Temminck, according to his peculiar mode of nomenclature, under the denomination of “*Les Oies* ;” and with equal signification and more effect has been made into a genus, under the title of *Anser*, by M. Illiger, who therein followed the older naturalists that preceded Linnæus. These birds retain much of the manners of the *Waders*, from which we have lately parted. They are endowed with considerable facility in walking, are found to swim but seldom, and they do not dive at all*. In these characters, as well as in other particulars to be observed hereafter, they correspond with the family of *Laridæ*, which meets them at the other extremity of the circle of *Natatores*. To this division succeeds *Cereopsis*, Lath., strongly allied to the preceding *Anseres* by its general structure, but still more typical in the family in consequence of the length and nakedness of the *tarsi* above the knee : characters which indicate a greater power of walking, and a greater deficiency in swimming. It joins the third division, or the genuine *Anates*, by means of a group of which *Anas arborea*†, Linn. is the representative. This third

* “ Ils vivent dans les prairies et dans les marais, nagent peu, et ne plongent point.” Temminck, *Man.* p. 816.—In addition to *Anser*, this first division contains *Cygnus*, Briss., together with *A. bernicla*, and its congeners.

† “ D’autres espèces, (*A. arborea*, *viduata*, &c.)—ont avec le bec des canards des jambes plus hautes mêmes que celles des oies ; elles se perchent et nichent sur des arbres.” Cuv. *Regne Anim.* i. p. 538.

and most typical group of the family, which accords with M. Temminck's first section of "*Canards proprement dits*," still approaches more closely to the land-birds than the birds which follow: the species swim with ease, and even dive, but the latter faculty they seldom exercise unless when pursued. Their food is also less exclusively marine than that of the succeeding groups, being composed of vegetables, grains, and insects, in addition to fish*. This division, consisting of many prominent forms, of which *A. arboorea* before mentioned, *A. tadorna*, *boschas*, *clypeata*, *penelope*, and *querquedula* may be considered types, is distinguished from the remainder of the "*Canards proprement dits*" of M. Temminck, by the hind toe being entire, or free from the lobated membrane which is attached to the hind toe of these last. This character of the lobated membrane, which is of considerable importance as pointing out the approach of the birds in which it is found to the more typical oceanic families, prevails in all the remaining groups of the present family. It is strongly conspicuous in *Mergus*, Linn., the next division that appears to follow: and we consequently find that the species of that genus carry the powers of swimming and diving to the greatest extent, making use of their wings also in their progress through the water; and at the same time exhibiting a constrained and embarrassed mode of walking, in consequence of the backward position of the legs. It thus forms the passage to the succeeding family of *Colymbidæ*. In the shape of its bill, which is slender and partially compressed, it exhibits a distinct form in its own family: but still, by means of the bill of an intervening

* "*Les Canards* — dont le pouce n'est point bordé d'une membrane, ont la tête plus mince, les pieds moins larges, le cou plus long, le bec plus égal, le corps moins épais; ils marchent mieux; recherchent les plantes aquatiques et leur graines, autant que les poissons et autres animaux." *Cuv. Regne Anim.* i. p. 536.—"Ceux se submergent rarement dans d'autres cas que lorsqu'ils sont poursuivis.—Leur nourriture se compose indistinctement de végétaux, de graines ou d'insectes et de poissons." *Temm. Man.* p. 831-2.

species,

species, the *M. albellus*, Linn., which is intermediate in its breadth and depression, it preserves its connexion with the *Anates*. We hence pass to the fifth and last group of the family, which, with the bill of the *Anates*, retains most of the characters conspicuous in *Mergus*. The forms most prominent in it, represented by the different Linnean species *A. ferina*, *clangula*, *histrionica*, and *mollissima*, possess a strongly lobated hind toe*; they frequent the ocean for the most part, where they dive with the greatest facility and for a length of time; and they live chiefly on marine animals. Their legs are also thrown behind the equilibrium of their body; and thus also they evince their contiguity to the typical *Natatores*. By means of the group which contains *A. mollissima*, our well-known *Eider Duck* and its congeners, where the bill, with an elevated protuberance at the base, approaches that of the *Anas olor*, Linn., we find ourselves brought round to the *Cygnus* of the present day, which forms part of the first division. That genus in like manner deviates partially from the conterminous genus *Anser*, in its legs being thrown more backward, and its consequently greater awkwardness in walking. Here then the affinities are evident which thus establish the perfect return of the series of the *Anatidæ* into itself. Before we leave the family, I must indulge myself in observing a most conspicuous peculiarity which marks the series of affinities among these groups. The long and slender neck observable in the *Grallatores* is preserved in such groups of the *Anatidæ* as are most conterminous to that order, such as *Cygnus*,

* “Ceux — qui ont au pouce un large rudiment lâche, plongent habituellement et long-tems : ces derniers vivent sur les grandes mers.” *Temm. Man.* p. 831.—“Les espèces — dont le pouce est bordé d’une membrane, ont la tête plus grosse, le cou plus court, les pieds plus en arrière, les ailes plus petites, les doigts plus longs, les palmures plus entières. Elles marchent plus mal, vivent plus exclusivement de poissons et d’insectes, et plongent plus souvent.” *Cuv. Regne Anim.* i. p. 532.

Anser, *Bernicla*, and *Cereopsis*, until it is superseded by the short necks of the more oceanic *Anatidæ*, which exhibit all the expansion and capaciousness of throat observable in the typical *Natatores*.

The distinctively marked character of the lobated hind toe, which prevails among the latter groups of the family we have just quitted, conducts us to *Podiceps*, Lath., that commences the family of *Colymbidæ*, where the same character is strongly developed. The difference between the bills of the types of these two families is softened down by the intervention of that of *Mergus*, which is intermediate between the broad and depressed bill of *Anas* and the narrow and sharp-pointed bill of *Podiceps*. This last genus, in conjunction with *Colymbus*, Linn., from which it differs chiefly in the construction of the foot, composes the family of *Colymbidæ*. These two well-known groups, differing but little among themselves in external characters, form one of those normal groups of the order, where a deficiency is exhibited in the powers of flight by the shortness of their wings, and in the faculty of walking by the backward position of their legs. These deficiencies in the groups before us are compensated for by their capability of remaining for a length of time under water, and by their superior powers of diving. For this latter purpose the structure both of their wings and legs is admirably adapted: the former by their strength assisting them as oars under water, and by their brevity not interfering with their progress; the latter, by their compressed and sharpened edge offering no resistance to the water as they are drawn up to effect the stroke which accelerates the movements of the bird. From their superiority in these characters and powers, the birds themselves have obtained *par excellence* the name of *Divers*. In these particulars we may observe them to be united to the *Alcadæ* which succeed them, and from which they are chiefly separated by the presence of the hind toe, conspi-

conspicuous here, but deficient in the family to which we now proceed.

We enter the family of *Alcadæ* by means of the genus *Uria*, Briss., which, it may be remembered, was originally included in the *Colymbus* of Linnæus, and from which it has been separated chiefly on account of the tridactyle conformation of its foot. This character distinguishes the greater part of the present group, which, in addition to *Uria*, contains the genera *Alca* and *Aptenodytes* of Linnæus. The latter genus apparently carries to the extreme the typical character of those groups in which the wings becoming gradually shorter, and less furnished with feathers, lose at length all their powers of flight, and assume the functions of fins instead of wings, to assist the bird in its progress through the water. The whole of the family before us, united by the form of the foot, is separated into generic groups by the different shape of the bill. And here a beautifully progressive series of affinities is apparent throughout the whole group. Beginning from the true *Aptenodytes*, we may observe that the bill of that genus is long, rather slender, and somewhat curved; while that of *Catarrhactes*, Briss., which succeeds, is shorter and more elevated at the ridge; thus leading the way to *Spheniscus*, Briss., where the sides are compressed, and the *culmen* elevated into a sharp edge. This structure approaches the form of the same member in the true *Alca*, in which the sides are still more strongly compressed, and the *culmen* more elevated. The *Fratercula*, Briss., the well-known *Puffin* of our rocky coasts, following *Alca*, exhibits the extreme of this singular construction: and there cannot be a more interesting subject of contemplation to him who may wish to witness the mode in which Nature harmonizes her groups, than the gradual change of form that unites the short and elevated bill of this last genus with the long and slender bill of *Aptenodytes*. A similar gradation

gradation of affinities between conterminous groups leads us back again to the point from whence we started. Some species of the Linnean *Alca*, which M. Temminck has united under the generic title of *Phaleris*, with bills less elevated at the *culmen*, and more tapering than that of *Fratercula*, lead us gradually to the *Mergulus* of Ray, the *little Auk* of our cabinets. This genus, strongly and distinctively separated both from *Alca* and *Uria*, in the former of which groups it has been placed by Linnæus, and in the latter by M. Temminck, may be considered as intermediate between them. It thus brings us to *Uria*, where the pointed and tapering bill, again discernible, reconducts us to *Aptenodytes*.

The groups that compose the last family are characterized by having no hind toe. Those of the family of *Pelecanidæ*, next in succession, and now before us, are distinguished by what is termed a syndactyle foot, the hind toe of the bird being directed to the front, and all the toes being united by a membrane. These two families, thus separated from each other, are however brought into contact by the *Aptenodytes* of the last family, which possesses a hind toe, but small and feeble in construction, in which it approaches the three-toed *Alcadæ*; while on the other hand it has this member directed to the front, but without a connecting membrane, by which means the four toes are similarly placed with those of the *Pelecanidæ*. The family now before us, corresponding with the "*Totipalmes*" of M. Cuvier, comprises the whole of the groups which formed the genera *Pelecanus*, *Phaeton*, and *Plotus*, of Linnæus. The first of these genera is divided into the following generic groups; *Phalacrocorax*, Briss., which seems to retain the nearest affinity to the birds of the last family in habits and appearance; *Onocrotalus*, Briss., the genus so familiar to us as including the *Pelican of the Wilderness*; *Sula*, Briss., which contains our *Gannet*; and *Tachypetes*, of M. Vieillot, the

Frigate

Frigate Bird of our cabinets. The manners of this last bird I have discussed somewhat at large at the commencement of this inquiry, as well as the various particulars by which it deviates from the type of the *Natatores*, in conjunction with the greater portion of the present family. I shall not therefore dwell upon the subject any further than to mention its intimate and acknowledged connexion with the genus *Phaeton*, both in habits and general economy. In these particulars, as well as in the length of their wings and their extended powers of flight, these two groups evince a near alliance with the family of *Laridæ* which succeeds, and from which they can only be separated in consequence of their syndactyle foot. The genus *Plotus*, united by its bill to *Phaeton*, leads back to the earlier groups of the *Pelecanidæ*, with which, though it differs from them by the straightness of the bill, it agrees in manners and general organization.

The *Phaeton* of the last family bears a considerable resemblance in general appearance and habits to the *Sterna*, Linn. of that upon which we now enter. The before-mentioned construction of their foot alone effects a separation between them. Even here, however, we may observe the gradation that exists between the feet of the two families; the web that unites the toes of the *Tropic*, as well as of the *Frigate Bird*, is but half the size of that of the *Pelecanidæ* in general; and thus their foot preserves a connexion with that of the *Terns*, where the same membrane is equally contracted. We thus enter the family of *Laridæ*, by means of *Sterna*, with which *Rhynchops*, Linn. most intimately accords in habits and external characters, notwithstanding the dissimilitude of the bill. The *Sterna Anglica*, or *gull-billed Tern* of Col. Montague, conducts us from these genera to the groups which compose the Linnean *Larus*, now justly subdivided into two genera, the *Leptis*, Ill., and *Larus* of authors. From this group we are led to the genera *Diomedea*, Linn., and *Haladroma*, Ill., which are characterized

terized by the absence of the hind toe, by means of the species *Larus tridactylus*, Lath., where, though the hind toe is not absolutely deficient, as might be inferred from the specific name, there appears but the rudiment of one, or rather a stump without a nail. The last-mentioned genus *Halodroma* originally belonged to the *Procellaria*, Linn., and was separated from it by its tridactyle foot. Even in this character, however, it forms a passage from *Larus* to the groups that compose the genuine *Procellaria*, all of which are distinguished by the singular peculiarity of having no true hind toe, but a nail adhering to the *tarsus* in its place. We thus arrive at the *Petrels*, separated into the groups of the *Procellaria*, Auct., *Pachyptila*, Ill., *Puffinus*, Ray, and the section denominated by M. Temminck “*Les Petrels Hirondelles*.” These two latter groups appear to lead us back to the *Terns*, or *Sea Swallows*, from whence we started. The whole of this family, which corresponds with the “*Longipennes*” of M. Cuvier, is distinctly characterized by the strength and expansiveness of their wings, with the aid of which they traverse immeasurable tracts of the ocean in search of their food, and support their flight at considerable distances from land, seldom having recourse to their powers of swimming. We may thus discern the gradual succession by which the characters peculiar to the order descend from the typical groups that swim and dive well and frequently, but make little use of their wings for flight, to the present groups, which are accustomed to fly much, but seldom employ their powers of swimming, and never dive*. The family of *Laridæ* may thus be observed to stand at the very extremity of the order, and it assumes, as I have already observed, in conjunction with the

* “Le plus grand nombre des espèces qui composent les premiers genres de cet ordre (sc. *Sterna*, *Larus*, *Procellaria*), se reposent sur la surface de la mer, volent le plus souvent, ne nagent point habituellement, et ne plongent jamais.” Temm. Man. p. 730.

other extreme groups, much of the habits of the land birds. A portion of the group before us, the *Petrels*, seem even to employ their feet in their own element as if on land, walking, as it were, on the surface of the waters*. We have thus arrived at the termination of the last family of the order, and have to look for its connexion with the first. This link is immediately supplied by the before-mentioned genus *Pachyptila*, in which the bill, broad and depressed at the base, assumes the character of that of the *Anatidæ*†. There is indeed a considerable approximation and interchange of character between the two groups. The bill of some species of *Anser* may be observed to become gradually less broad and more compressed, so as to bring them closely to the *Petrels*; while again the web that connects their toes is equally curtailed in extent, until in one species, the *Semipalmated Goose* of Dr. Latham, figured in the Supplement to his "*Synopsis*," we may observe no greater web than may be seen among many of the *Sternæ*. On the other hand, the same membrane is so extended in some of the *Petrels*‡, as to equal the most dilated web observable among the *Anates*. We may also add that the divisions of the *Procellariæ*, as they approach the *Anatidæ*, become gradually more nocturnal in their habits, and thus adopt a character common to a great portion of the latter family§. Here then

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* "Celui (sc. le nom) de *Pétrel*, *Petit Pierre*, leur vient de l'habitude de marcher sur l'eau en s'aidant de leurs ailes." Cuv. *Regne Anim.* i. p. 515. "Dans leur vol, ils semblent effleurer les vagues de la mer, mais ils se posent très rarement sur la surface de cet élément, qu'ils semblent redouter, puisqu'on ne les voit jamais nager, bien moins se submerger; ils semblent piétonner sur la surface des eaux, mais toujours tenant les ailes droites et en l'air." Temm. *Man.* p. 801.

† "Les *Prions* (*Pachyptila*, Ill.), qui, semblables d'ailleurs aux *Pétrels*, auraient les narines séparées comme les *Puffins*, le bec élargi à sa base, et ses bords garnis extérieurement de lames comme les *Canards*." Cuv. *Regne Anim.* i. p. 517.

‡ As in *P. capensis*, Linn.

§ "Tout le genre (sc. *Procellaria*) est composé d'oiseaux plus ou moins demi-

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in the fifth and last order of birds we perceive the families of which it is composed following each other in a regular series of affinities, which returns into itself with a continuity similar to that which has been equally apparent in every other great department of the class.

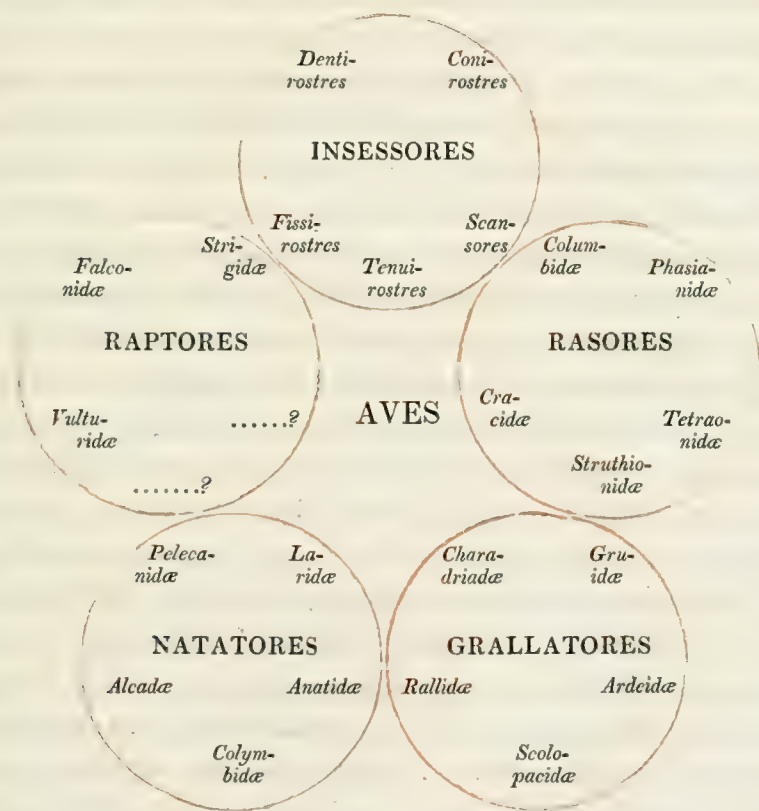
It now only remains for me to sum up the conclusions that may be drawn from the foregoing observations, and to exhibit in as short a compass as possible the affinities to which I have called so much of the attention of this Society, as connecting the Orders of Birds together and also their Families. For this purpose I beg leave to lay before them the following Table of Affinities, which shows at one view the circular succession in which the various groups of the class are united. The divisions which compose the typical order of *Insessores* will be recognised as more comprehensive than those into which the other orders have been resolved, and as forming tribes instead of families. A reference therefore will be necessary to the former table*, which being constructed on similar principles, I subjoined to my observations on that order, for the purpose of completing our information with respect to the regular succession of the families of the class. I shall not here enter into any remarks upon the analogies that may be

nocturnes, qui chassent et pourvoient à leur subsistance au crépuscule et à l'aurore, surtout pendant les nuits éclairées des régions boréales.—Ils (les *Pétrels proprement dits*) sont plus diurnes que les suivans.—Les *Pétrels puffins* sont, de même que les *Pétrels hirondelles*, oiseaux nocturnes qui chassent au crépuscule, et se cachent le jour dans les trous des rochers ou dans les tanniers de lapins et des rats, et ne sortent de ces retraites souterraines qu'au crépuscule, —.” *Temm. Man.* p. 801-2—4. “On the face of this expanse of waters, and perfectly secure from fowlers, lie all day long, in the winter season, vast flocks of ducks, teals and wigeons, of various denominations; where they preen, and solace, and rest themselves, till towards sunset, when they issue forth in little parties (for in their natural state they are all birds of the night), to feed in the brooks and meadows; returning again with the dawn of the morning.” *White, Nat. Hist. of Selborne*, p. 24. ed. 1813.

* P. 468.

observed

observed to prevail between the parallel or corresponding groups in the table before us. The investigation of such points would lead to a discussion which would far exceed the limits proposed in this brief inquiry. I have already entered into some explanation of the principles that regulate such relations of analogy, when investigating the order of *Insesores*; and the application of the same principles to the present table will afford much interest, and suggest many important inferences, to those who are familiar with the groups of ornithology.



N. B. By an oversight of the printer's, the circles in the diagram at page 468 were not made to touch each other, as in the diagram above; and they thus seem to convey an erroneous idea of the series of affinity being incontinuous.

Having now completed the original design which I sketched out for myself at the commencement of this inquiry, I hope I may be allowed to affirm without laying myself open to the charge of presumption, that I have redeemed the pledge which I offered when I ventured to assert the uniform succession of affinities throughout the various feathered tribes. I feel at least some confidence, that, however my readers may differ from me as to the general views with which, for the sake of convenience, I have arranged my subject, however dissatisfied they may be with the details through which I have pursued it, they will acknowledge the two chief points which alone I esteem as of essential consequence,—the general prevalence of natural affinities between the orders and between the families of the class, and the circular succession in which, whether we view them in more or less comprehensive departments, they are connected together. One or two chasms have confessedly occurred to interrupt the progression of these affinities, and the continuity of these groups: and a considerable variation has been acknowledged in the strength and intimacy of the affinities themselves. Some affinities have been observed to unite the neighbouring groups so intimately, as scarcely to admit of any intervention beyond that of a species between them; while others have evinced an approximation only, more or less close, between these groups, which will admit of many intervening forms before the connexion is perfected. But were the case otherwise,—were I to conceive myself enabled to produce a series that admitted of no chasms,—my knowledge of the present imperfect state of the science, the very conviction which has been forced upon me during the progress of the pleasing task of unravelling the intricacies of the subject before us, would give rise to a suspicion in my own mind, that my perfectly continuous series was rather the result of my own fancy, than a delineation of the actual state
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of things in nature. The very perfection of my plan would in that case be of itself the most formidable obstacle to my conviction of its truth and justness. Still, however, sufficient grounds have been shown, I trust, to prove the general prevalence of the principle which it is my wish to establish: and when we see it carried to so considerable an extent; when we find nothing to contradict it either in the groups which we already know, or in the species which are every day pouring in upon us—we may infer from analogy, I take it for granted, that the principle itself is universal; and that the deficiencies observable in our series are the result merely of our limited knowledge, and such as we may expect to see remedied as our acquaintance with nature becomes more extended.

How far the details that have been entered into in the foregoing view of my subject are correct, it is not for me to determine. I myself can detect many alterations that might take place, and many modifications that might be effected, without interfering with the general object of this investigation, or impugning the principles which it has been my wish to illustrate. Many of the different groups, for instance, might be enlarged at their extremes by important additions from the conterminous subdivisions, or might on the other hand be contracted by the transfer of a portion of their own extremes to the groups which adjoin them. Intervening assemblages might in like manner be formed out of the extremes on each side, and be separated from both, forming distinct and osculant orders or families between them, according to their extent and importance. Where there are no absolute divisions except species in nature,—and this from every observation I have been enabled to make I firmly believe to be the case,—every division which we are forced to institute in our arrangements for the convenience of illustration, and indeed for the purpose of mutual communication with those who
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are engaged in similar researches with ourselves, must be to a certain extent arbitrary and artificial. And every inquirer into nature may cause the line of demarcation, that separates his conterminous groups, to infringe more or less on the limits of either, according to his peculiar mode of viewing his subject. But concerning these more minute distinctions I have felt little solicitous. My chief object has been to seize upon the prominent features of nature ; to fix my attention, as it were, upon the grand elevations and projecting outlines of the prospect that lay before me ; to select in short the typical eminences that pointed out most distinctively the natural bearings of my subject. In this research, while it was one of my chief objects to ascertain the gradations by which my groups, distinguished from each other at their typical heights, were connected together at their base, I have considered it a matter of minor importance to determine the exact limits by which they may be supposed to be separated.

In a pursuit of this kind, and conducted by such views, the only earnest we can possess of having in any degree attained our object is a strict and exclusive adherence to the laws and dictates of nature. During the progress of the researches which have been necessary for the purposes of this inquiry, such an adherence therefore has been the criterion by which I estimated the value of every inference that I was induced to draw, and every principle that I ventured to inculcate. I have investigated each group with reference alone to its place in nature, to its habits and general economy. External character has been but of secondary moment as producing division, and essential only as it appeared subservient to the before-mentioned paramount principles ; that is, as far as it decidedly indicated some natural affinity, or an adaptation to some natural purpose. In the progress of such inquiries much important information has of course been afforded me by the observations of those who have preceded me

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on this subject, and many copious draughts have been taken from these valuable sources. But, while I have given due credit to every inference which my predecessors have been enabled to deduce from their own observations, and every affinity which their own judgement and experience have enabled them to point out, I have carefully abstained from adopting implicitly the systematic notions of any individual, or restricting myself to any particular line or mode of arrangement. Devoted to no school of natural science, and carried away by the dictates of no authority however high, no reputation however imposing, I have come to the investigation of my subject,—and I trust I may here be allowed to know myself,—unseduced by the fascinations of theory, and unfettered by the trammels of system. Whatever has appeared to me most conspicuous by its own merits, and most conformable to the truth of nature, I have unhesitatingly extracted from every source, in whatever school or country it may have been promulgated, or by whatever systematic views or scientific arguments it may have been supported. Considerable has been the aid for which I am thus indebted to the labours of my predecessors. Besides the valuable information which I have gleaned from the works of the earlier systematic ornithologists, our own Ray in particular and M. Brisson, much obligation is due on my part* to the clear, cautious, and discerning acumen of M. Illiger ;—much to the commanding views and generalising mind of M. Cuvier ;—much to that scientific sagacity and those enlarged and penetrating powers of investigation, which have placed M. Vieillot in the highest rank of philosophical inquirers into nature ;—and

* I speak here only of professed systematic ornithologists. Were I to enumerate my obligations to all whose public writings or whose personal friendship have partially contributed to my information, I should be involved in an endless return of gratitude and acknowledgement.

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much to that accuracy of observation and unwearied diligence of research, which have deservedly entitled M. Temminck to the reputation of being the first practical ornithologist of our days.

But there is a name still higher than all,—and as a member of this Society, I feel that I may indulge myself in referring to it with almost filial reverence—*Clarum et venerabile nomen!* to which the debt due by every lover of ornithology should be repaid by something more than bare acknowledgement. Whoever can form a just estimate of the important benefit that is conferred on every branch of Natural History by a comprehensive and luminous arrangement of its grand and primary subdivisions, and a perspicuous exposition of the leading affinities by which neighbouring groups are connected, will pay this just tribute of gratitude to the transcendent genius of LINNÆUS. It is true that a disposition has latterly prevailed to underrate the reputation of that great name, and the more specious pretensions of later ornithologists have partially thrown his merits into the shade. And this undeserved detraction has been increased if not occasioned by that fatality which ever awaits eminence of all description. For it has been his fate, in common with every exalted character who may be considered the founder of a school in science or philosophy, to have suffered more by the injudicious zeal and overweening partiality of his professed supporters, than from the undisguised attacks of those who would raise themselves upon his subversion. The former, regardless of the state of this department of nature at the period when he undertook to arrange it, and forgetting that the first efforts even of his great mind in reducing his subject into order were necessarily but the rudiments of the science ;—mistaking, in fact, the foundation of his system for its perfect consummation, and thus making the grasp of the infant Hercules the measure of the powers of his manhood ;—these his injudicious supporters, I repeat, adhering solely

solely to the letter of his works, but unmindful of their spirit, have palmed upon him a confined and restrictive code of arrangement, as foreign from the enlarged views of his own enlightened mind, as from the disposition of that Nature of which he was so faithful an interpreter. What was intended to have been applied to her works on a general and expanded scale, they would apply upon the minutest : they would make that system which they wish to uphold, an universal and unalterable standard for the adjudication of every object that may be referred to it, however great or however contracted may be its dimensions. They would preserve this system, in short, as it came from their master's hands, unenlarged and undiminished ; admitting no increase to suit the increasing knowledge of the times, no modification to embrace the accumulating modifications of Nature. It is not therefore to be wondered at, that the adversaries of this great man should have rejected *in toto* a system, which either their interest or inclination did not permit them to investigate, much less treat with justice, and which, thus modelled to their hands, they found unsuited to any practical purpose.

But to arrive at a just knowledge of the question before us, we must judge from the merits of the case itself, and not from the partial views of either friends or opponents. It is to be remembered that there are three great stages in the progress of natural science, after it has assumed somewhat of a definite form, which are marked by decisive limits. The first is confined to the investigation of the more extensive affinities that prevail among the scattered productions of nature, and to the arrangement of them according to these leading affinities. The second takes place at that period when the materials of the naturalist become too far multiplied to admit of being classed in the more extended departments alone, and when his business is rather the investigation of differences than of affinities, and the subdivision of groups

rather than their combination. The third and more perfect stage is when the advantages of both these methods are embraced, when both the affinities and the differences of natural objects are so far consulted, and the synthetic and analytic modes of arrangement so far combined, as to give a view of Nature with reference as well to her greater as her minuter divisions, and to dispose her productions according to their grander proportions as well as in detail. It is evident that a vast accumulation of materials must be laid before the man of science, before he can venture upon this last and most finished mode of investigation; and that even at the present moment, although he may make the attempt, he can give no more than a faint and powerless outline of the face of nature, abrupt in some points, and a total blank in others. It must be equally evident to those who are aware of the truly infant state of the science when Linnæus undertook the revision of the groups of Ornithology, that he could have advanced no further than the first of the above stages in his attempt, and could have had no object at the time beyond the investigation of the affinities which unite the larger groups. And here lies his great and transcendent merit.—I speak of course only of his exertions in Zoology, and in that branch of it still more particularly to which our attention is at present confined.—And in this point of view it might afford us matter for astonishment, were we not acquainted with the matchless powers of his mind, to observe, that, notwithstanding his limited acquaintance with species, his mode of arranging Nature's grand outlines is more enlarged in its views, and more conformable to the affinities of her groups, than that of any of his successors, in despite of all the advantages with which time, and the new lights that are every day thrown upon science, have enriched them. In fact, although the productions of at least one fifth part of the world were almost entirely unknown to him,—and those, it may be remembered, embracing

that connect the Orders, and Families of Birds.

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believing more than their due proportion of variety of families. Although even at the present moment more than three times the number of species have been examined and described beyond what could have come under this observation, yet on a more enlarged view of this exalted mind, that this principal division are still sufficiently extensive to embrace with some slight modification all the later acquisitions of science and so conformable to our more advanced and accurate knowledge of nature, as to require little if any alteration. These three great primary divisions, under whatever denomination we may receive them, whether according to the great influence of materials that have latterly exerted not their limits to an almost disproportioned extent, we give them a more comprehensive title than that by which they designated them, whether in short, they may be designated Tribes, or Families, or Genera. The name signifies nothing, — not still from the justest of considerations for all researches in Natural History, and the a sort of tribunal to which every grand difficulty and every leading character may be referred for decision.

These primary divisions, it is almost unnecessary to add, have been my chief guide in the course of this inquiry. These I have studied with still increasing admiration, and have adopted with almost boundless confidence. And now it indeed necessarily that I should subscribe to the power of an individual, or admit any other dictator in my pursuit of nature, than Nature herself, the authority to which I would bow, and the light that I would implicitly follow, should be the enlarged and philosophical mind of the immortal Locke.

